



Performance Improvements for the Kenwood TL-922 H.F. Linear Amplifier

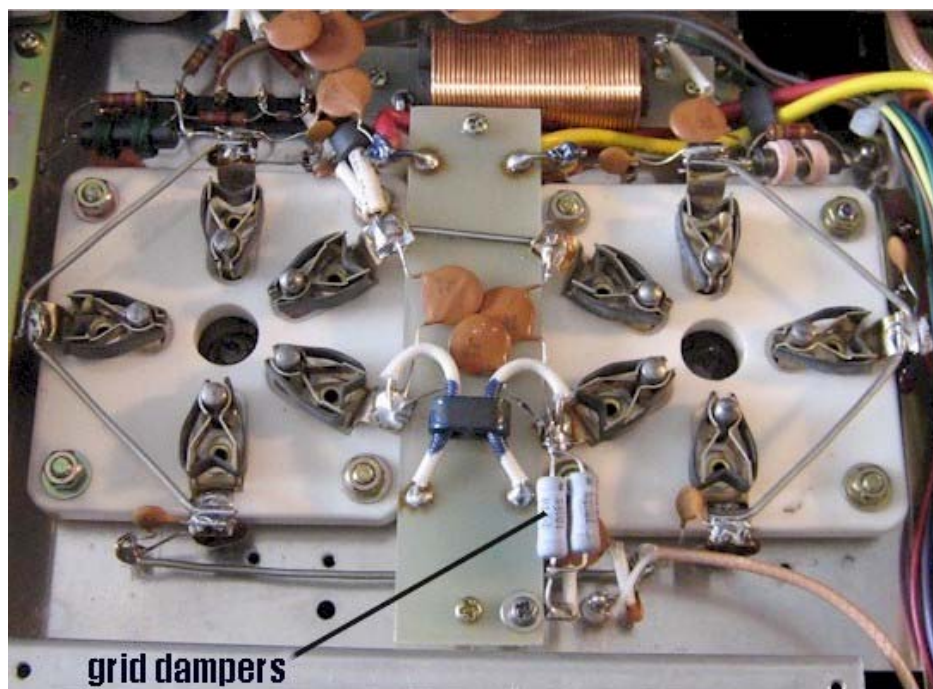
This page and relevant amplifier modifications are a "work in progress". Schematics of most recent modifications will be added as time permits. From researching the web I can see that there are many variations of the basic modifications and some are more worthwhile implementing than others. I've used modifications from a number of sources now, including a couple of my own ideas. These pages cover replacing the original open frame relays with quieter, faster reed and vacuum type R.F. relays as well as solid state bias switching. This will also involve some control circuit changes to provide correct voltages for the new relays and sequencing. More suitable anode parasitic suppressors will be fitted too.

A few years ago I fitted a vacuum antenna relay and reed input relay plus a relay sequencing circuit to my own TL-922 and have been very pleased with the quieter operation and zero arcing of contacts during VOX operation since then. The relay sequencing circuit I used was a modified version of the one Tom Rauch, W8JI offers on his web site - <http://www.w8ji.com>. At the time I left the original bias relay in place and this still produced quite a bit of audible noise when switching during VOX operation. I recently replaced it with a solid state relay and this has made the amp much quieter.

The following information outline the modifications recently incorporated into another TL-922 and include electronic bias control, vacuum antenna relay, reed input relay, modified bias diode arrangement, using a 'string' of IN5408, as well as improved anode parasitic suppressors.

Thanks to PA0FRI, VE3FWA, W8JI & AG6K for the valuable information found on their web sites.

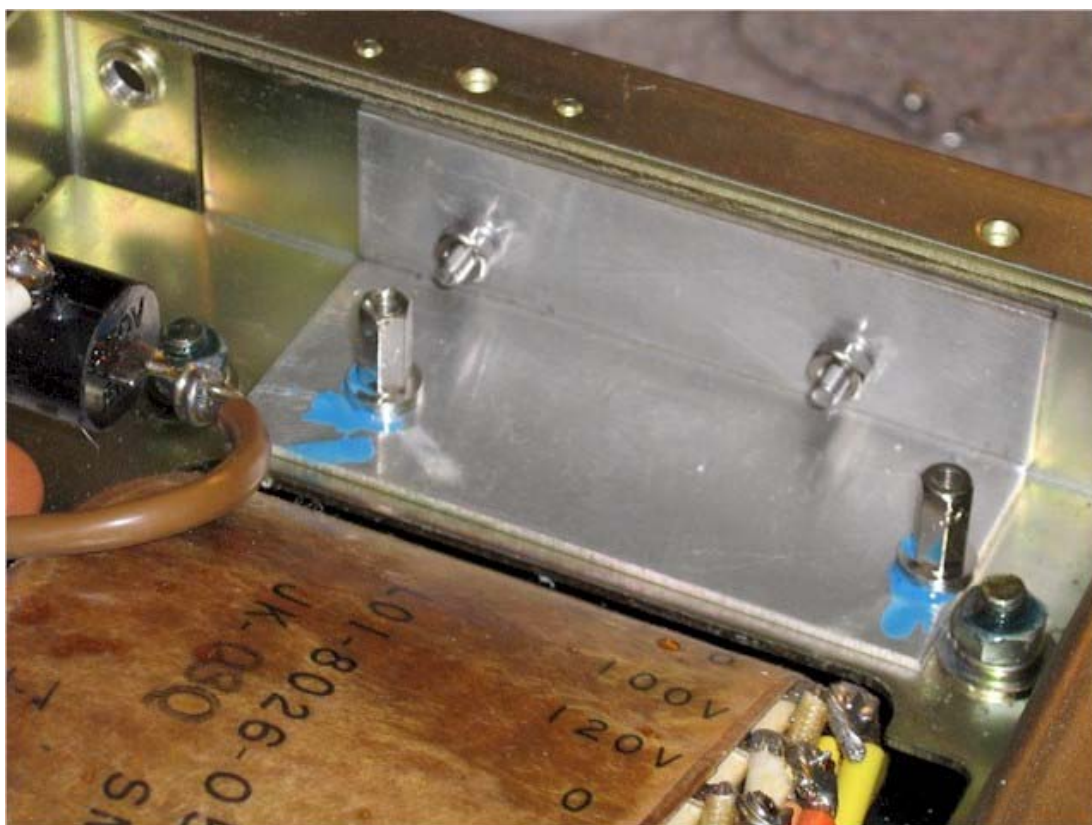
New: [Click here to go to the schematic modifications](#)



The above photo shows the two 10 ohm grid circuit damping resistors and straps tying grid pins together on each tube. An extra 330 pf grid bypass capacitor has also been added to each grid pin.



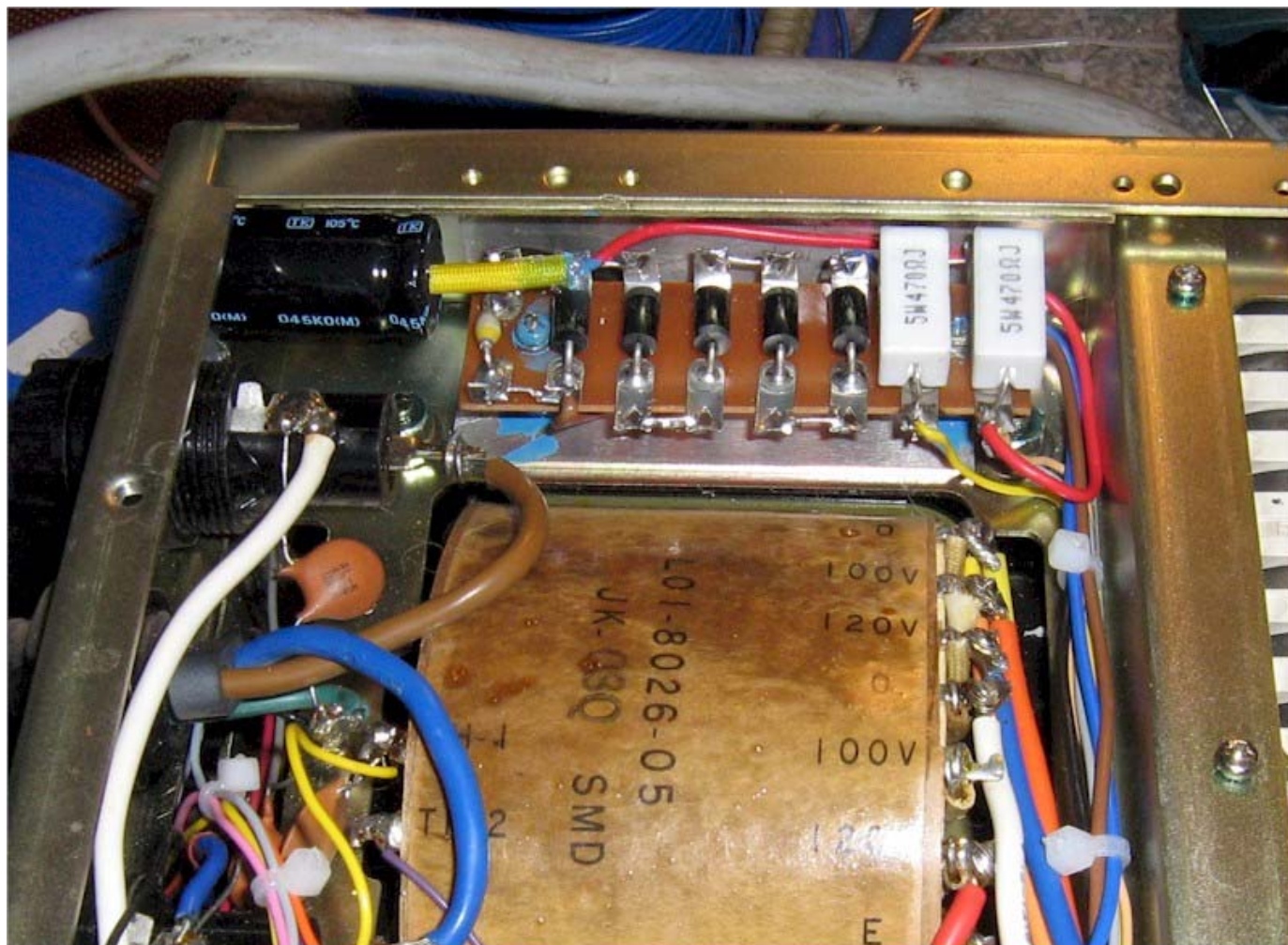
Original inductor L2 replaced with a 10 ohm 'glitch' protection resistor in high voltage supply.



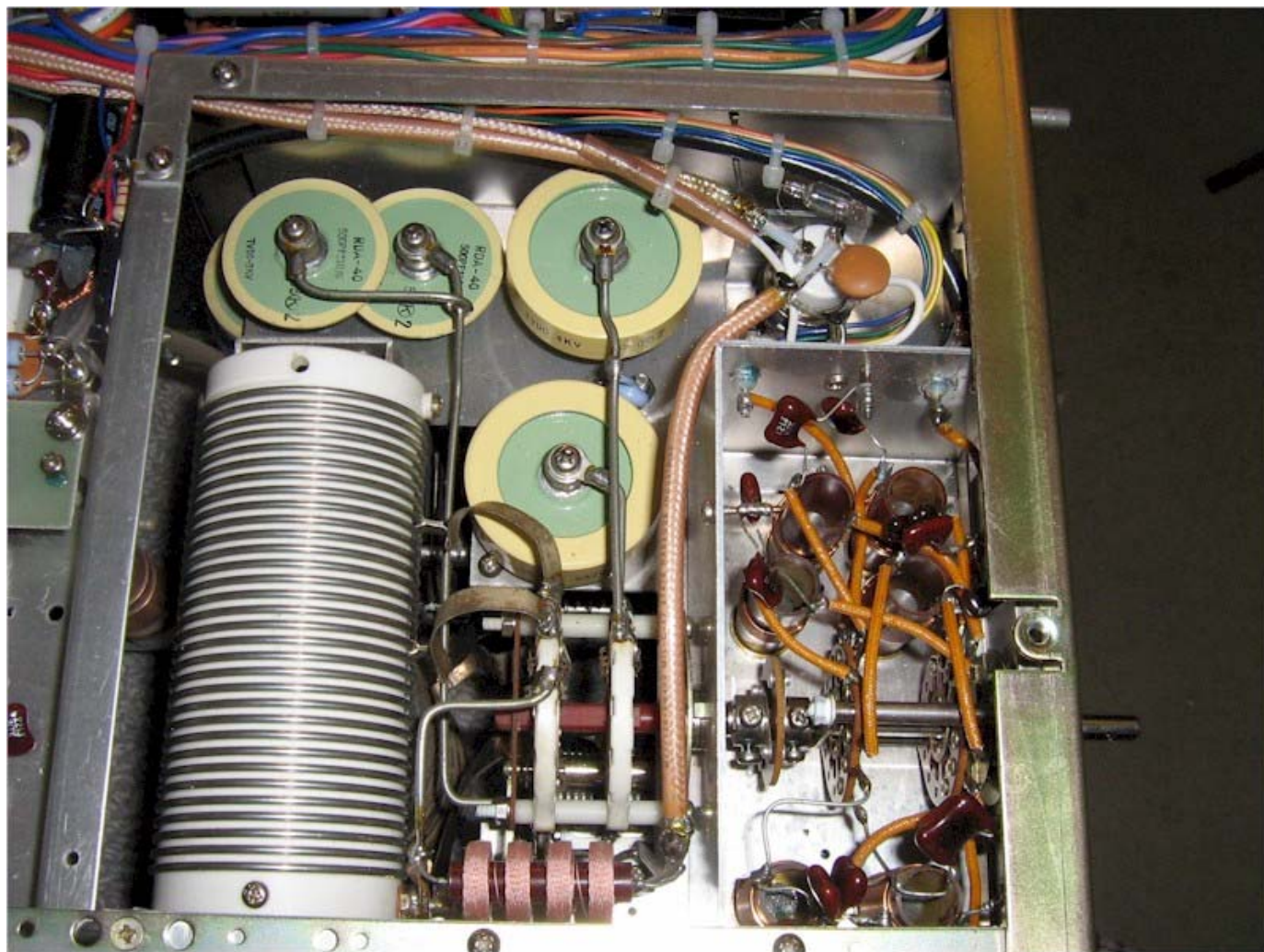
A mounting bracket is fabricated from 1.6mm thick aluminium and fitted adjacent to the H.T. power transformer . The tag strip and new bias diodes will be fitted here.



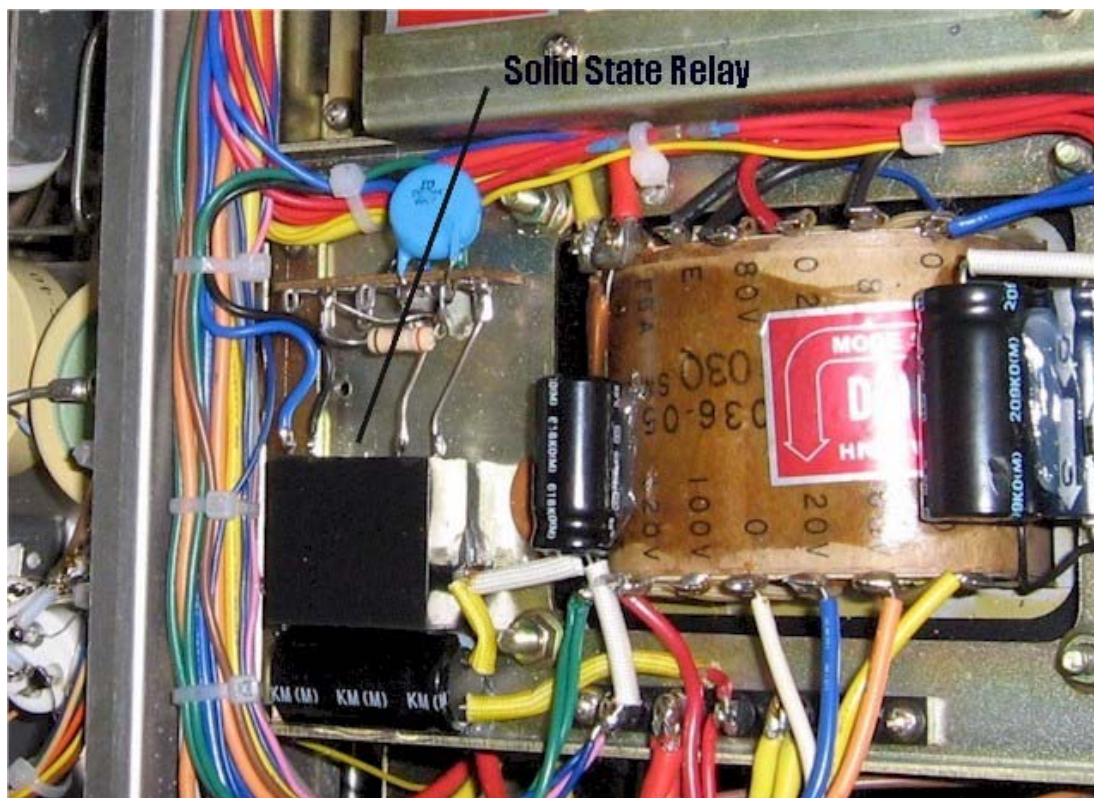
Bracket is attached to main chassis with countersunk screw heads so as not to interfere with the side panel when refitted.



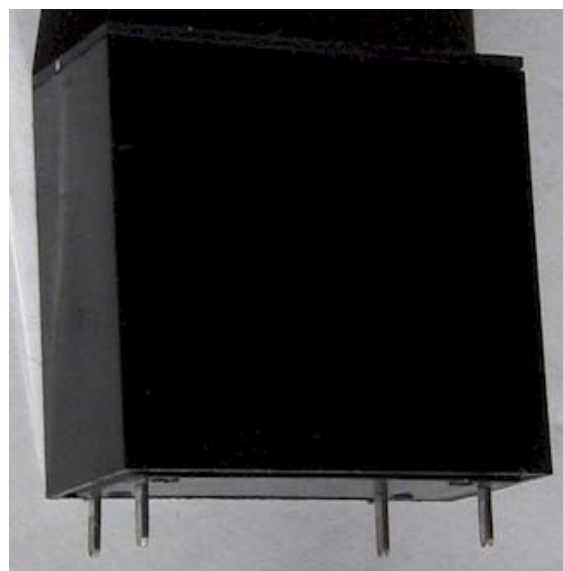
New grid bias arrangement, a string of 1N5408 diodes, mounted on a tag strip and secured to the bracket shown in the preceding photos. Individual diodes can be bypassed (shorted) to adjust plate idle current to the desired value (approx. 200-220 m.A.). The two 470 ohm, 5 watt resistors are used in the vacuum relay speed-up circuit.



A vacuum relay and a reed relay replace the original open frame relays. The Vacuum relay is mounted through a suitable rubber grommet which is located in a fabricated 'L' shaped aluminium bracket. The relay is secured in the grommet with a small amount of silicon rubber such as [Silastic](#) etc. This helps to reduce noise transfer. The reed relay is out of view. It is attached to the side of the housing for the input tuned circuits and adjacent to the vacuum relay. The input relay, output relay and electronic bias switch are correctly sequenced. i.e. On PTT signal from the transceiver the output relay closes first, followed by the R.F. input relay and then the tube is biased on. Upon de-key from the transceiver the bias circuit is cut off, the input relay returns to the standby state followed by the output relay.



A solid state 'relay' is used as the Electronic Bias Switch and replaces the original relay which was mounted at the rear of the amplifier. A small reed relay is mounted there now and controls the front panel Standby & Transmit lamps. Input requirements for the solid state relay are 9-20 volts DC @ 20mA. The output can switch up to 2 amps D.C. The original 7.5 volt bias diode and associated heat-sink have been removed (and replaced by the IN5408 diodes) to make space for these new components.



The two photos above show a close-up of the solid state relay. The 100 Volt transistor output version is preferable however I've been using the 50Volt version for quite some time with no problems being experienced.

This relay can be purchased in Australia from Jaycar Electronics or their wholesale division Electus Distribution. The catalogue number is **SY4093** and web site address is:- www.electusdistribution.com.au

The relay is manufactured by Hongfa Electronics in China and is represented in the U.S. and Europe. www.hongfa.com

[Click here for the data sheet](#)



The new parasitic suppressors can be seen above. Made from 2mm diameter silver plated wire and two 100 ohm metal oxide resistors in parallel.



The two photos above are of this TL-922, after the mods and tuned up on 160 metres and into a Bird oil cooled dummy load. Because of the damage to the original Penta 3-500Z tubes, a new set of Chinese 3-500G tubes were sourced from R.F. Parts in California, U.S.A. To date, these Chinese tubes have proven to be trouble free and give good output but require a little more drive from the exciter.

This page was last updated on Saturday, 03 May 2008

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Amateur Radio VK2FC