KENWOOD

Technical Information Exchange

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Circuit Improvements for the TL-922

by Richard L. Measures, AG6K

In its factory-stock form, the TL-922 has the following problems:

1. The filament inrush-current is 48 peak amperes. This exceeds Eimac®'s maximum allowable rating for the 3-500Z.

2. When operated from a stiff 240vac source, the inrush-current through the on/off switch is so great that it will eventually cause switch failure. .

3. The filament-voltage is typically 5.3V measured between pins 1 and 5 on the 3-500Z sockets when the amplifier is operated from 120V/240V, 60Hz. 5.3V exceeds Eimac®'s maximum filament-voltage rating. According to Eimac®, each 3% increase in filament-voltage, above what is needed to achieve full power output, will reduce the useful emission life of a directly heated amplifier-tube by one-half. The bottom-line is that at 5.3V the useful emission life of the 3-500Zs will be reduced to about one-sixth of what could be realized if the filaments were operated at 4.8V.

4. The noisy RF relay is so slow that it causes the amplifier to hot switch with many modern transceivers.

5. Burned or vaporized output-bandswitch contacts; shorted zener bias diode; arcing/pitting of tune-capacitor's plates; filament-to-grid shorted 3-500Z or 3-500Zs. These problems are caused by an intermittent VHF parasitic-oscillation at 130MHz. See "Parasitics Revisited" in the September and October, 1990 issues of QST magazine, for a discussion of this subject.

Fixes

Fix for problem 1: Install a stepstart circuit for the entire amplifier. All that's needed is a 100vdc, or 12vdc, or 24vdc-coil; dpdt relay with 10A contacts, and a pair of 25 Ohm, 7 - 10 watt resistors. If a 12v or 24v coil relay is used, a rectifier-capacitor filter circuit is added to rectify the 11vac that is available from the filament-transformer. A fullwave bridge circuit is used for 12vdc coil relays. A fullwave voltage doubler circuit is used for 24vdc coils. Use a series R between the coil and the source of DC voltage to control the relay pull-in threshold. Adjust the R so that the relay pulls in when the HV reaches around the 60% level.

Fix for problem 2: This problem is taken care of by the fix for problem 1.

Fix for problem 3: Add resistance between the filament-transformer and the filament-choke. The easiest way to accomplish this is to replace the stock heavy-gauge wires between the filament-transformer and the filament-choke with smaller-diameter, lossier wires. If your line-V is 240V or 120V, a slightly longer run of 22-gauge, >105ºC-rated, stranded hookup wires will bring the filament-voltage down to the optimum 4.8V. 22-gauge wires will run comfortably warm to the touch in this application.

Fix for problem 4: Add high-speed RF relays and an electronic cathode bias switch to the amplifier. This is not a difficult modification. The circuit is shown in the January 1994 QST on page 33. The stock relay in

the 922 makes an excellent step-start relay. It can be mounted in the roof of the terminal box at the rear of the amplifier. There is plenty of room for the step-start resistors. Mounting holes for a perfboard are inside the terminal box. The resistors are mounted on the perfboard.

Fix for problem 5: Remove the stock high VHF-Q parasitic-suppressors and install low VHF-Q parasitic-suppressors. Repair any damage that was caused by the intermittent VHF parasitic oscillation. Items to check: the Zener diode front to back ratio; the plate current meter shunt resistance; and the grid to ground RFCs are prime candidates.

Note: Fixing the TL-922's designed-in problems will definitely void the warranty. The good news is that most warranty returns seem to be caused by the designed-in problems. If the problems are fixed up-front, the TL-922 will very likely perform reliably for many years. >>>Modified TL-922s should never be returned to "Factory Service." Such amplifiers should only be touched by knowledgeable persons.<<<

If you need help repairing or modifying a TL-922, please feel free to telephone me at [805]386-3734. If you need a parasitic suppressor retrofit-kit, I sell them. They have a money back guarantee. If you would like to discuss the step-by-step process of modifying a TL-922, try Dario, N5QVF, [915]-691-9808 in Abilene, TX.

This is the short version of the circuit improvements section in "QSK for the TL-922 and SB-220 With Circuit Improvements for the TL-922"--which is available on the home page.