

# A homemade isolation transformer to cure H-K shorts

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A bright red, green or blue screen with retrace lines often means a heater to cathode (H-K) short in the CRT. When TVs used 60Hz to power the CRT filament, we bypassed this problem by installing a large, heavy isolation transformer for the filament. Now that filaments are powered by the high-voltage transformer, isolation transformers are small and light. And it's easy to wind your own. The materials for the ones I make cost me under two dollars, and I can wind one in about five minutes.

Actually, the first isolation transformers I used were free. Some TV sets used toroid transformers of about 1-1/2 to 2 inches in diameter near the ac input as a line choke. I snipped these out of junked sets and they worked well as isolation transformers. But like most good freebies, they seem to have become scarce.

Toroid cores are not all the same. The core material affects the permeability and thus the inductance for the same number of turns on similar sized cores. I wanted a small, light core that would require few turns of wire. Ocean State Electronics (800-866-6626) has a wide selection of cores. Their stock number FT82-75 has a permeability of 5,000, allowing 14 turns of No. 22 wire to produce about 500 $\mu$ H to 550 $\mu$ H of inductance.

I use GC hookup wire, which has a rather thick coating of insulation. Such thick insulation may not be necessary, but I wanted to be sure a CRT arc would not cause a short in my isolation transformer.

Wiring the transformer is easy. Just cut two 18-inch lengths of the No. 22 hookup wire. You can use the same color and mark one wire for the primary, but a different color for each wire is better. Stretch the two wires side by side and slide a core to about the center of the two wires. Make fairly tight turns around the core, alternately doing 2 or 3 turns on each side

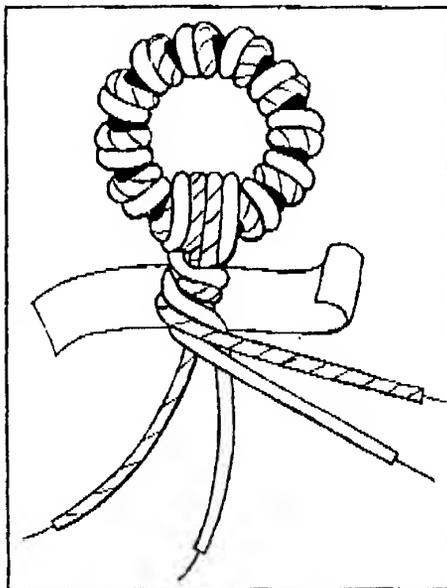


Figure 1. If you encounter a TV set with a heater to cathode (H-K) short, an isolation transformer such as this one, that you can make yourself, will allow you to restore the set to almost perfect operation.

of the starting point. (All doubled turns are the same direction, but starting in the middle of the wire means less wire to thread through the core).

You should be able to just fit 12 turns on the core in a single layer. Then make one more turn with each set of wires in a second layer for a total of 14 turns. Give the ends a twist next to the core and wrap a little tape around the twist to hold it together. You should have about two inches of wire left over for external hookup. See Figure 1.

I needed to answer three questions about the transformer before using it. Did it cause an excessive load on the HVT? Did it supply enough current for the filaments? Would it cause distortion of the TV's picture?

Since the voltage going to the primary of the isolation transformer is shaped like the retrace pulse that is its source, calculating the current drawn by the isolation transformer with its secondary open (no load current) would be difficult. But by leaving the secondary open and hooking the pri-

mary to the filament supply from the HVT of a used 19-inch set I had, I could monitor the B+ current to the horizontal output transistor and check for the additional load current caused by the isolation transformer. I found the current increased from 0.315A to 0.316A, or 0.317A (the last meter digit fluctuated). This increase of only 1mA to 2mA did not seem excessive.

Still monitoring the horizontal output current, but with a test pattern on the TV and the contrast and brightness turned to maximum, I got a reading of 0.625A, whether the filament was powered directly or through the isolation transformer. I was not able to see any difference in the brightness or contrast of the picture whether the isolation transformer was installed or not. This indicated that enough current was being supplied for the filaments. Of course, if there had actually been a H-K short, there would have been some slight smearing of the video due to the short.

I also checked the filament waveform from the HVT with a scope. It was a 28V pulse with a small dip in the center of the peak. With maximum brightness/contrast of the set, I could see no difference in either waveshape or amplitude whether or not the isolation transformer was installed, another indication of no excess loading on the HVT.

The point of the transformer, of course, is to allow the dc voltage of the filaments to be the same as that of the cathode to which the filament is shorted so as not to pull the cathode's voltage low. So if a filament pin is grounded on the CRT socket board, you may have to cut a strip out of the foil going to the grounded filament pin.

Only the secondary of the isolation transformer should hook to the filament pins. The primary of the isolation transformer goes to the filament leads from the HVT, either the actual wires, or their connections on the CRT socket board. The transformer is so light that it can be mounted by taping it to a low voltage wire from the CRT socket. ■