Assembly Manual

In-circuit LOPT/FBT Tester

Cat No. K 7205

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Here's the design for a low cost, easy to build and use battery operated 'shorted turns' tester for line-output or 'flyback' transformers, and other HF wound components like deflection yoke windings and SMPS transformers. Tests have shown it capable of finding at least 80% of LOPT/FBT faults, so it can save a lot of time and trouble. Small and rugged, it's well worth a place in the toolkit of anyone involved in servicing TV receivers, video monitors and computer power supplies.

If you're reading this, then chances are that you're a TV and/or computer monitor repair technician - who doesn't need to be told that horizontal output stage faults cause more than their fair share of headaches! Operating at high voltages, frequencies and power levels, many components in this part of the circuit are highly stressed, and failures are not only common but their cause is often hard to identify.

The usual symptom of a major horizontal output stage fault is a serious overload of the DC power supply feeding the primary winding of the line output transformer, or `LOPT' for short (called the `flyback' transformer or `FBT' in North America). This is often accompanied by a collector-to-emitter short circuit in the horizontal output transistor or `HOT'.

(For consistency, we'll be referring to the line output transformer as the `LOPT' throughout this article - North American readers please mentally substitute `flyback' for this term!)

Any of quite a few possible components could be the cause of such a failure, the more common being one of the high-speed rectifier diodes fed by the LOPT's secondary windings, including the diode stack(s) which produce the extra-high-tension (EHT) supply of around 25 kilovolts for the final anode circuit of the cathode ray tube. It's also possible the HOT has failed simply from old age or overheating due to unevenly-applied/solidified heatsink compound. Another occasional culprit is an insulation breakdown in the deflection yoke's horizontal winding.

However the failure which service technicians dread is a shorted winding in the LOPT itself. Unfortunately LOPTs tend to be specifically designed for the make and model of the TV or monitor they are used in, which can mean a lot of hunting around for a replacement. In addition they are hardly ever cheap, and not always physically easy to replace.

In short the LOPT is not a component which is easy to test by substitution, and a service technician needs to be as certain as possible that the LOPT really is defective, before tracking down a replacement!

Identifying faults

Several techniques have been developed over the years for identifying faults in horizontal output stages, and testing LOPTs in particular for the presence of shorted winding turns.

The components in the horizontal output transistor's collector circuit, including the LOPT's primary winding, deflection yoke horizontal winding, and tuning capacitors form a reasonably low loss (high Q) resonant circuit, especially at low voltage levels.

Most testing techniques, including the one used in this design, are based on the fact that nearly all serious faults in the