

# Diagnosing intermittent television problems

By Homer L. Davidson

Intermittent problems caused by bad connections, sockets, pc boards and components produce more headaches and loss of time for the consumer electronics technician than any other type of symptom. A poor soldered connection covered by a blob of solder is difficult to locate. Poorly-tinned resistor or capacitor leads that become open circuited may cause many hours of wasted time (Figure 1). Fine cracks in pc wiring produce many intermittent problems. Improper soldering of the terminals of a surface mounted device (SMD) may cause hard to find intermittent problems that warrant a professional electronic detective.

Alternately applying heat and cold with hot air and coolant spray to suspect parts, boards and soldered connections may cause the problem to occur, thus allowing the technician to correct it. A bright fluorescent lamp with magnifier may reveal poor connections and damaged pc wiring. Raising and lowering the power line voltage using a variable isolation transformer has turned up many intermittent and defective components. Sometimes resoldering the entire pc board wholesale is the only answer.

Whatever the intermittent condition, the cracked board, dislodged component, poor socket connections and pc wiring will always haunt technicians. Newer double-sided pc wiring with fine traces are especially susceptible to breaks and intermittent symptoms. Poor tinning of electronic part leads may leave oxides that will cause the product to malfunction years later. Warping and bending of the main pc chassis may damage wiring connections of surface mounted components. Poor soldered joints are found even in the latest TV chassis.

## Poor PC board connections

Ever since pc boards were first introduced, poor pc board connections caused problems. In some cases, when the chassis has been dropped in shipment or han-

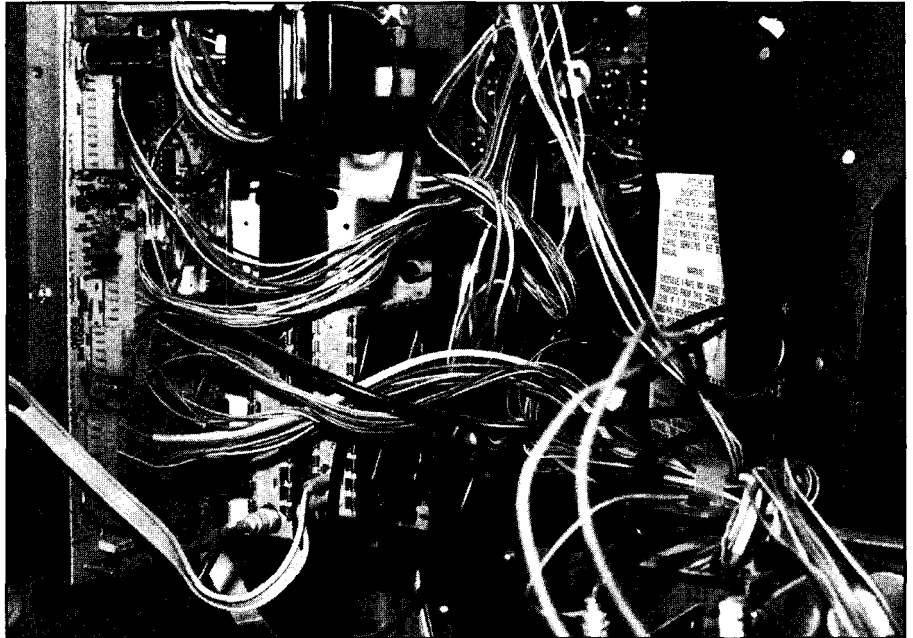


Figure 1. Poor crimped wires and plug connections may cause intermittent problems

dled roughly, a break in a connection between the component and the pc wiring may occur, and only cause problems later. Small cracks around transformer lugs or

components may be visible with the magnifying glass, but breaks around capacitor and resistor leads may not be visible until the component is probed while the

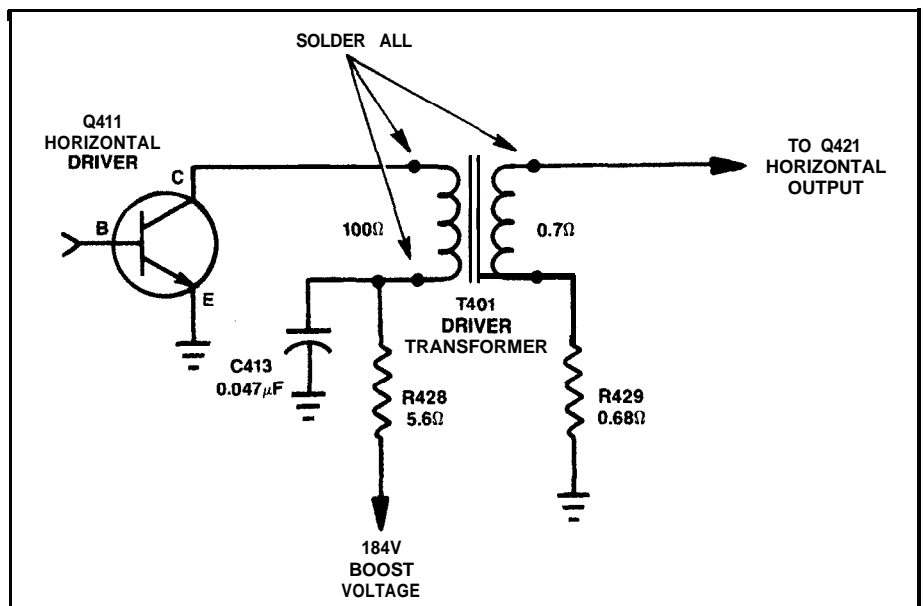


Figure 2. Solder the board connections when the problem is intermittent. The horizontal driver transformer in the horizontal circuits of this RCA GER654 model caused intermittent start up and shutdown.

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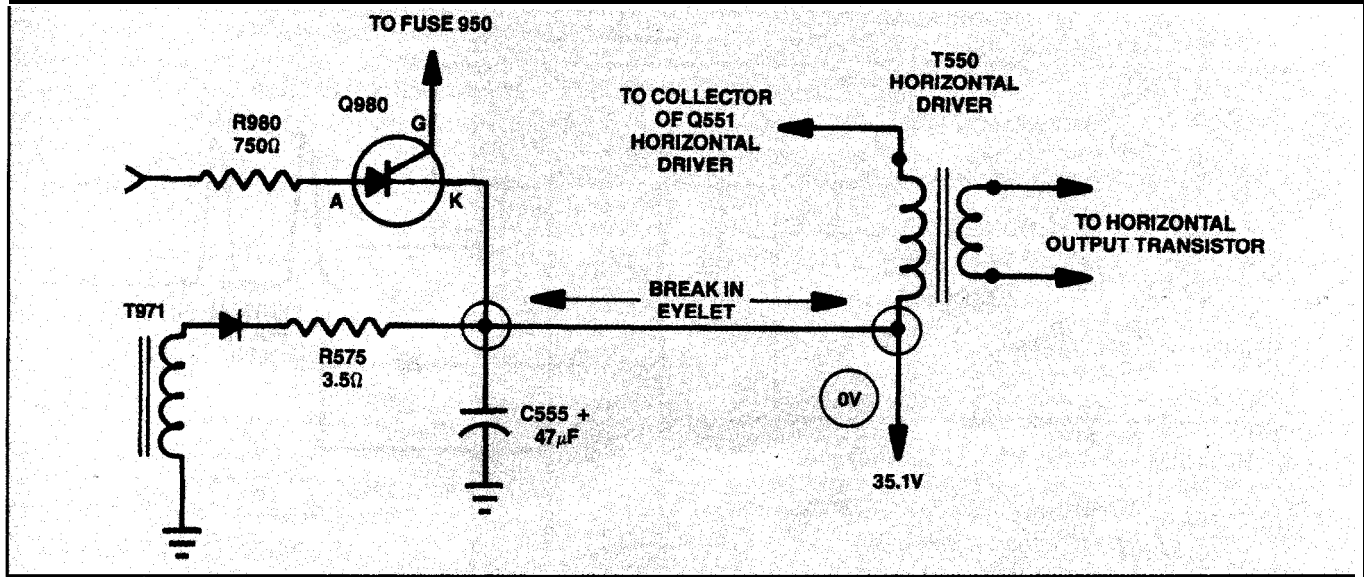


Figure 3. The no-raster, no-HV, no-sound problem was caused by a break in an eyelet at the pc wiring of a JC Penney 681-2018A model.

connection is examined under bright lighting and magnification.

You may be able to locate the poor connection using continuity, resistance and voltage tests. Locate the suspected sections on the schematic and compare the same section on the TV chassis. Then check each component within that sec-

tion. Probe small parts with an insulated tool. Large components can be wiggled to determine if that causes the intermittent problem to **occur**.

### An intermittent Sony chassis

In several low-priced Sony (1988-1989) TV portables, the symptom was a

click of the relay followed by chassis shutdown. Sometimes the set would play for several minutes and at other times it would shut down immediately after being turned on. When I probed at the horizontal circuits, the chassis really acted up, especially when the horizontal driver transistor was moved.

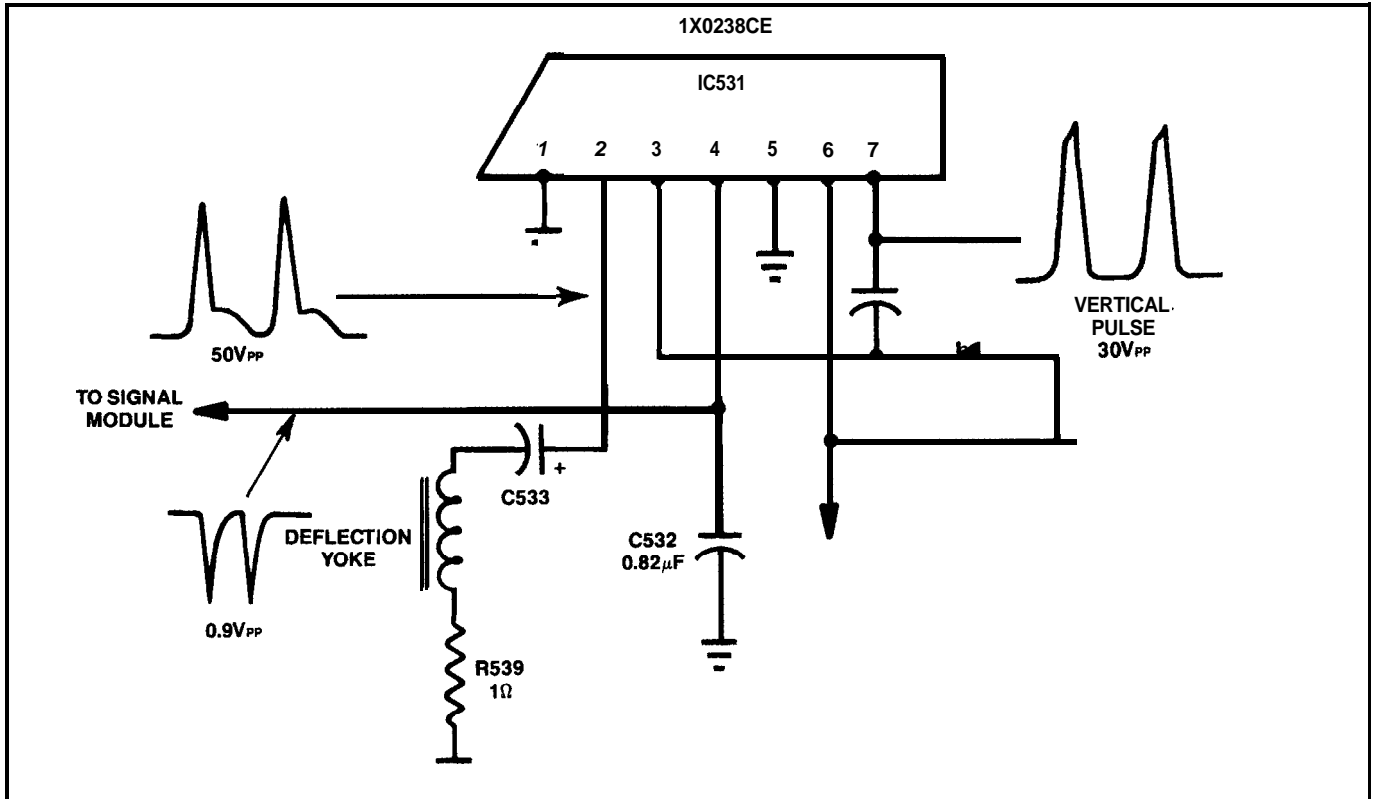


Figure 4. Intermittent vertical foldover in a Sharp 19SB60R portable was caused by a board connection of the signal board module.

Although all connections of the transformer appeared normal, I touched them up with the soldering iron, a method that had worked on a few chassis. In other chassis, replacing the driver transformer solved the chassis shutdown problem.

#### RCA intermittent start up and shutdown

The symptom was intermittent start up

and shutdown in an RCA GFR654 model. Sometimes the chassis would start up and operate for several hours before shutdown. At other times the chassis might not start up at all. If I happened to jostle the chassis or cabinet accidentally, the set began to act up.

Wiggling a few components in the horizontal section would cause the chassis to shut down. No doubt poor board connec-

tions in the horizontal circuits were the cause of the intermittent chassis. I found that the chassis would act up when I probed at the horizontal driver transformer (Figure 2). I soldered all connections on the driver transformer terminals. This solved the intermittent start up and shutdown problems.

#### Double-sided pc boards

Large double-sided pc main chassis have a tendency to warp, pull pc wiring and break connections. These small wiring cracks may occur where a component ties into the pc wiring or where soldered eyelets feed through to wiring on the other side of the chassis. If these breaks are clean breaks, the chassis will be dead. If the ends of the broken pc wiring maintain contact, the result may be intermittent problems. Of course, the dead chassis is easily repaired while the intermittent takes more service time.

In a JC Penney 68 I-2018A model, the chassis was intermittent. Any time the chassis was moved or prodded the set would shut down, resulting in the symptom of no HV, no raster and no sound.

Resistor R980 (750Ω) was running red hot, feeding Q980. Extremely low start-up voltage was measured between K and

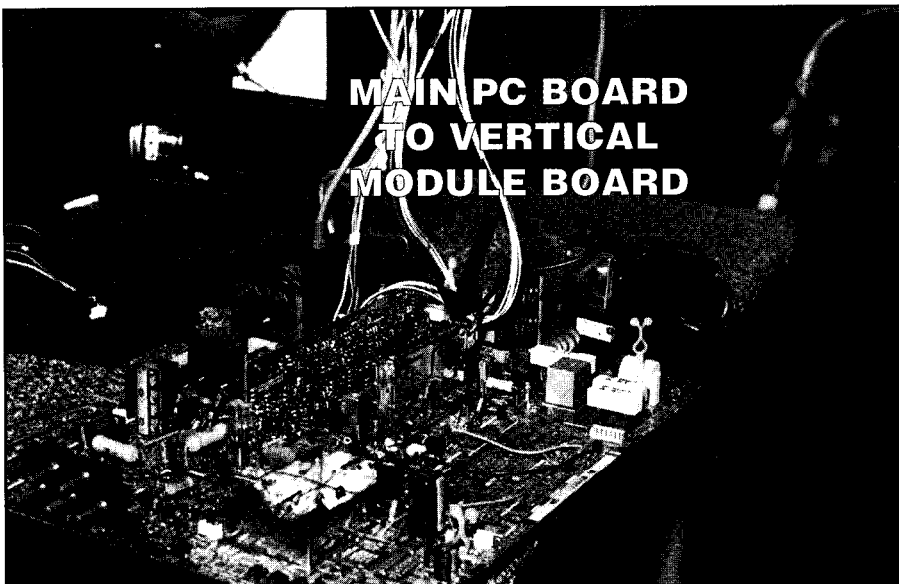


Figure 5. When the board module was probed the vertical raster would come and go in the Sharp TV portable.

Q980 (Figure 3). Finally, after several hours of voltage and continuity measurements, the wiring between K and the 35V source of the horizontal driver transformer (T550) opened completely. This allowed me to locate the broken eyelet and repair it by placing a small piece of hookup wire through the soldered eyelet and soldering each end of the wire on the top and bottom of the pc wiring.

#### Cracked boards

A large crack or break in a pc board is easily located, while a fine-line break in the pc wiring is more difficult to find. If the set is fairly old, it may be necessary to try to repair the broken area, rather than to hope to find a replacement board. Older boards frequently are not available. Cracked board wiring can be repaired with hookup wire.

**Always use a magnifying glass while repairing the cracked board area. Run hookup wire over the cracked wiring section and solder to a component lead on each side of the broken wiring section. Make sure that the connections you make are on the same pc wiring, or you might cause additional damage. Creating a solder bridge across the broken wiring is not recommended. This might effect a repair temporarily, but this repair might become intermittent later.**

Another frequent cause of intermittent problems is board sockets that are mounted on top of a pc board and soldered directly to the pc wiring. Separate pc boards mounted on top of a large board chassis may have broken or cracked connections to the main chassis. Often, touching up these connections with solder and iron may solve the intermittent problem.

A new Sharp 19B60R exhibited the symptom of vertical foldover with the picture upside down. In addition, there was a bright white line through the center of the raster. The waveform at the input terminal was normal when I checked it with the oscilloscope. Most voltages on the vertical IC were within specification (Figure 4). I suspected a leaky or open IC (I X0238CE) and ordered a new one.

After I installed the universal replacement for the vertical IC (SK7673) the symptom was the same. A closer check of the schematic revealed that the vertical output pulse was connected to a sig-

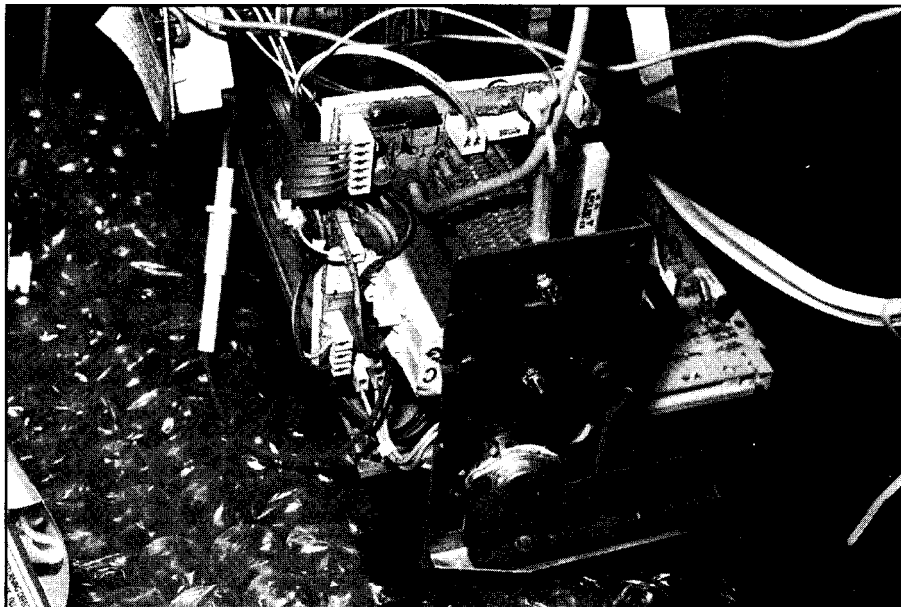


Figure 6. Suspect socket and harness connections when the problem is intermittent.

nal module above the board. I noted that whenever the module or board was wiggled, the raster briefly appeared normal and then reverted to a folded over raster. Soldering the board-to-board connections solved the foldover symptom (Figure 5).

When the problem is intermittent, do not overlook poor board socket connections with crimped wire leads. Check for poor socket connections at the bottom side of the pc wiring. Remove the plastic plug and inspect each crimped wire. Sometimes a crimped wire lead does not make a good connection, or the wire becomes corroded and produces intermittent operation (Figure 6). Check the continuity of the connecting wire or cable.

Check wire leads and plugs attached to

the tuner modules. Poor pin and corroded plug connections may produce intermittent reception, or no reception at all.

In one RCA CTC140 chassis, a fuzzy picture and other picture problems occurred when I tapped around the tuner and chassis. Just moving the tuner caused the fuzzy picture. Soldering the tuner pins on U2300 solved the intermittent picture. In another CTC140 chassis, loose connections on IF Amp transistor Q2300 caused the same symptom.

A customer complained that the channels would intermittently change up from another channel without any one touching the control on an RCA EXR345. Sometimes the set would operate for days before the channel would automatically

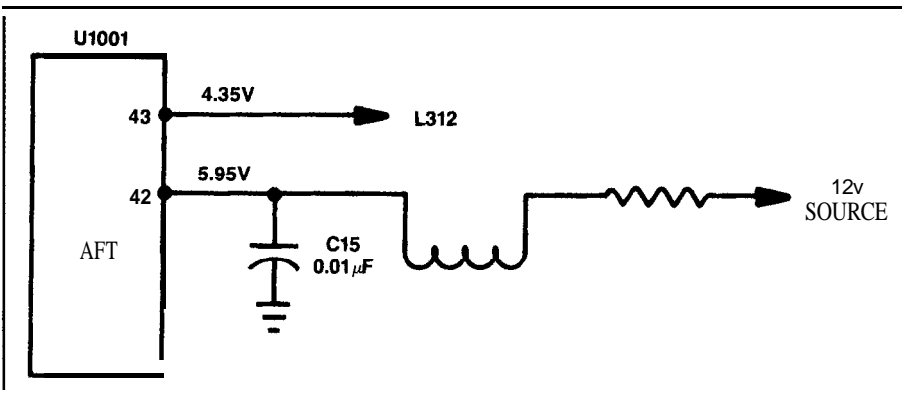
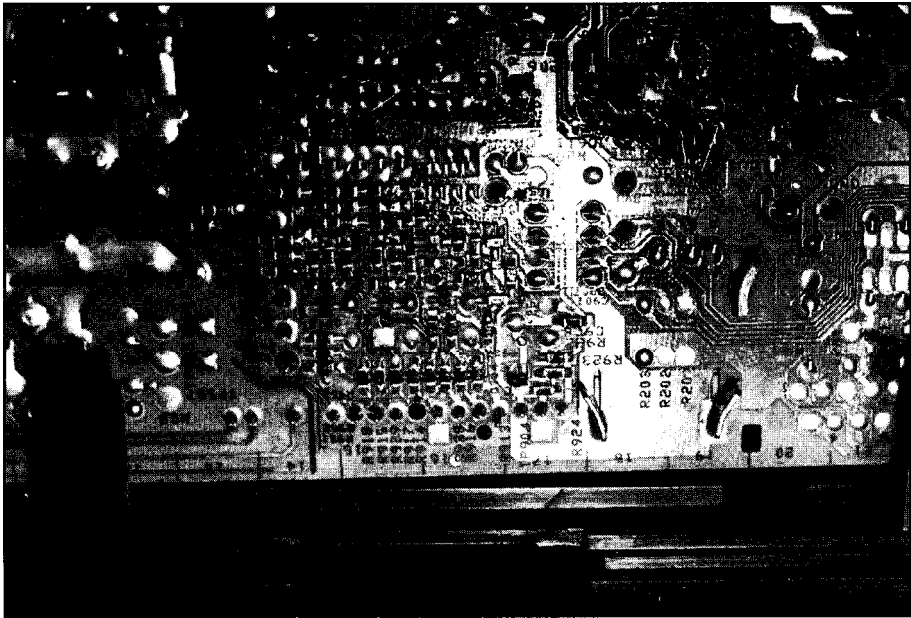


Figure 7. A poor connection in L312 caused the channels to change spontaneously in an RCA EXR345ER model.



**Figure 8.** Look for fine SMD breaks and poor pc board connections when flexing the board chassis.

change upward. After the problem occurred a few days in a row, the owner brought this portable into the shop.

All voltages on the tuner terminals were normal. Of course this could change when the chassis acted up. I monitored the dc voltage source and AFT terminals of UIOOI. When the chassis began to change channels, the dc voltage at pin 42 of UIOOI would vary between 1Vdc and 2Vdc. Pin 43 of UIOOI appeared normal at a lower 3.2V (Figure 7).

Assuming UIOOI was leaky, I disconnected pin 42 from the dc circuit by removing solder around the pin with desoldering braid and a soldering iron. I measured the voltage at pin 42 and also at the foil connection of 42. Both mea-

surements were low. Upon checking the circuit diagram once again, I noticed that there was a small coil (L3 12) between the 12Vdc source and pin 42. Although connections upon L3 12 looked okay, soldering both ends of the coil solved the self-changing channels.

#### Intermittent component leads

Besides poor component lead connections upon pc wiring, check for poor tinned or defective component wiring to the terminal connection. Look for poor soldered transformer and coil leads soldered to the terminal lead. Sometimes a broken coil wire or poor soldered joint at a terminal will result. These leads may be wound or pulled too tight, and any expan-

sion or rough treatment of the chassis may cause a poor connection. Improper tinning of the coil wires or terminal tie wires may result in a poor connection to the terminal lead.

Intermittent color and video were symptoms in an RCA CTC108 chassis. The audio was normal. After monitoring the voltage sources and checking for proper waveforms, the cause of the symptom was traced to L306. Removing the coil from the chassis and resoldering both leads to their respective terminals solved the intermittent color and video problems.

### **Intermittent SMD connections**

In today's TV sets you may find through-hole components mounted on the top side of a TV chassis and surface mounted parts underneath. Intermittent breaks in fine pc wiring, surface mounted device connections and poor soldered component connections have produced numerous intermittent problems in these latest sets. Surface mounted components increase the problems, since parts are mounted on both sides of the pc chassis.

When you're faced with a product that features surface mount devices, try to isolate the symptoms to a given section. Monitor the different stages with waveforms and voltage tests. Take continuity measurements of the pc wiring and components. Probe small components with an insulated tool to locate a poor lead or soldered connection (Figure 8).

A lighted magnifying glass may be used to check out the small surface mounted devices on the pc wiring. The fine break between SMD terminal and pc wiring is difficult to see. Touch up the junction with small size solder and iron tip if it looks as though this might be necessary. Use a sharp pointed soldering iron tip to touch up poor board connections. Be careful when applying heat around surface mounted components.

### **Conclusion**

Intermittent board, socket and pc connections may be more difficult to locate on sets with SMDs, than on other TV chassis. Special soldering techniques and equipment must be used to locate and repair poor board connections of surface mounted devices. Try to isolate the area on the pc wiring in which the poor connection occurs, using symptom analysis, before working upon the chassis. ■