TECHNICAL TIPS

TROUBLESHOOTING FLOW CHARTS FOR MONITORS

by RANDY FROMM

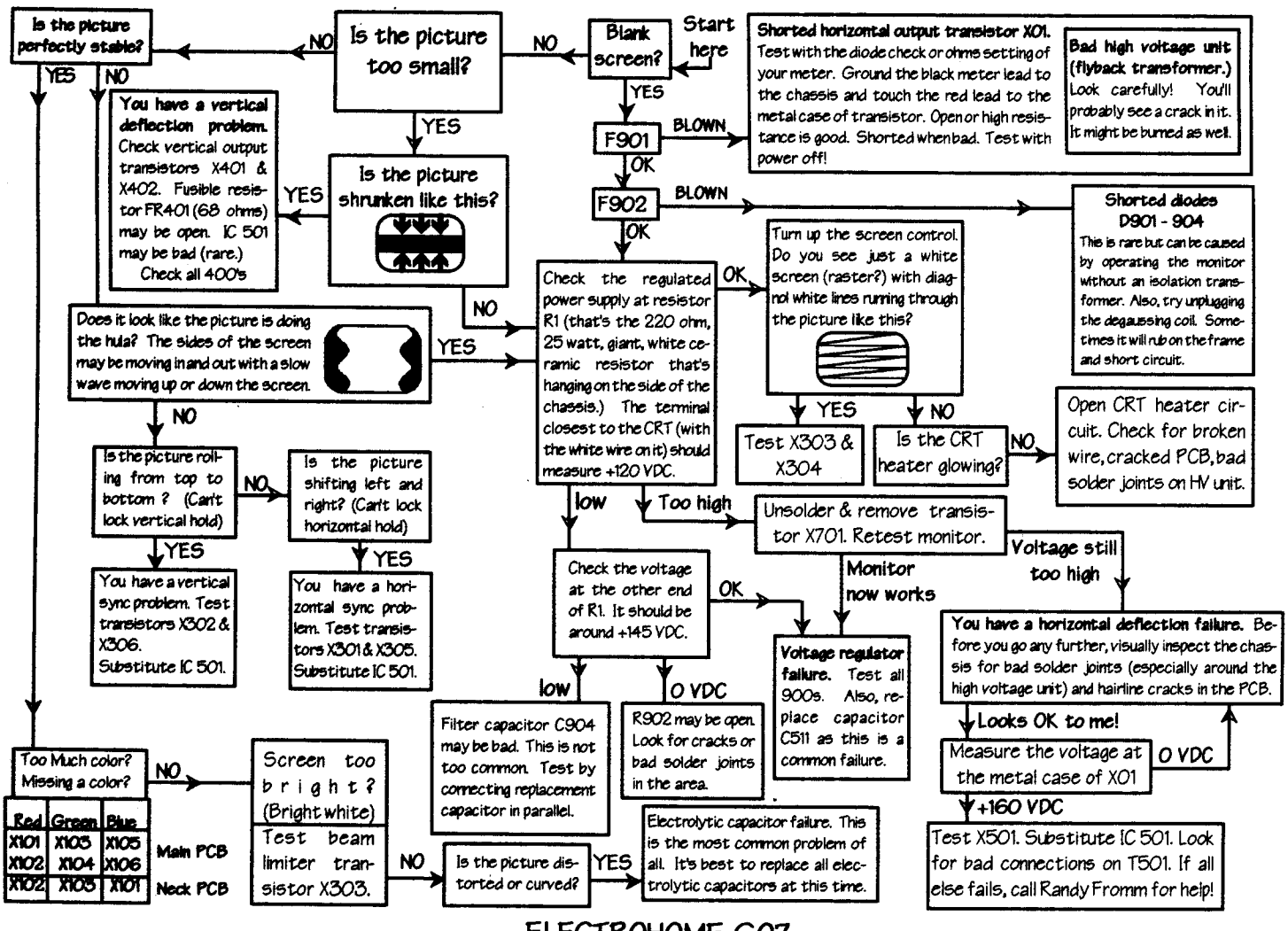
ELECTROHOME GO7

Troubleshooting and repairing the Electrohome GO7 monitor is usually pretty easy. There are some common failures that you'll see again and again. Monitor repair is even easier if you follow this simple, step-by-step procedure.

The flow-chart alone should allow you to isolate the problem down to a single defective circuit or component. Just answer the questions and follow the arrows to the source of your problem. For further detail about the various symptoms and tests that are presented on the flow chart, read on!

Start Here

With the proper video and sync



ELECTROHOME GO7

inputs connected to a video game or pattern generator, connect the monitor to the 120 volt AC power source. Don't forget that if you're working on the monitor on a workbench, you must use an isolation transformer. Never connect the monitor directly to the power source. Of course, if you're working on a monitor that's still in the video game cabinet, the game's own isolation transformer does the job of isolating the monitor chassis from direct contact with the 120 volt AC line.

Blank Screen?

Look at the screen. Is it completely blank with no brightness or picture at all?

Fuse F901

Check the condition of F901 with the power turned off and your meter set to the lowest resistance (ohms) scale. F901 is the little (5mm x 20mm) fuse that's just to the right of the large, gray filter capacitor on the main printed circuit board (PCB). Is the fuse good or bad (blown open)?

If the fuse is blown, check the horizontal output transistor as indicated on the chart. The high voltage unit (flyback transformer) may also be bad. Inspect it for cracks or burned marks. The high voltage unit and the horizontal output transistor often fail in pairs. The flyback fails first and takes the transistor with it. Don't be surprised if the flyback transformer blows up after you replace the horizontal output transistor and fire up the monitor to test it. It happens all the time.

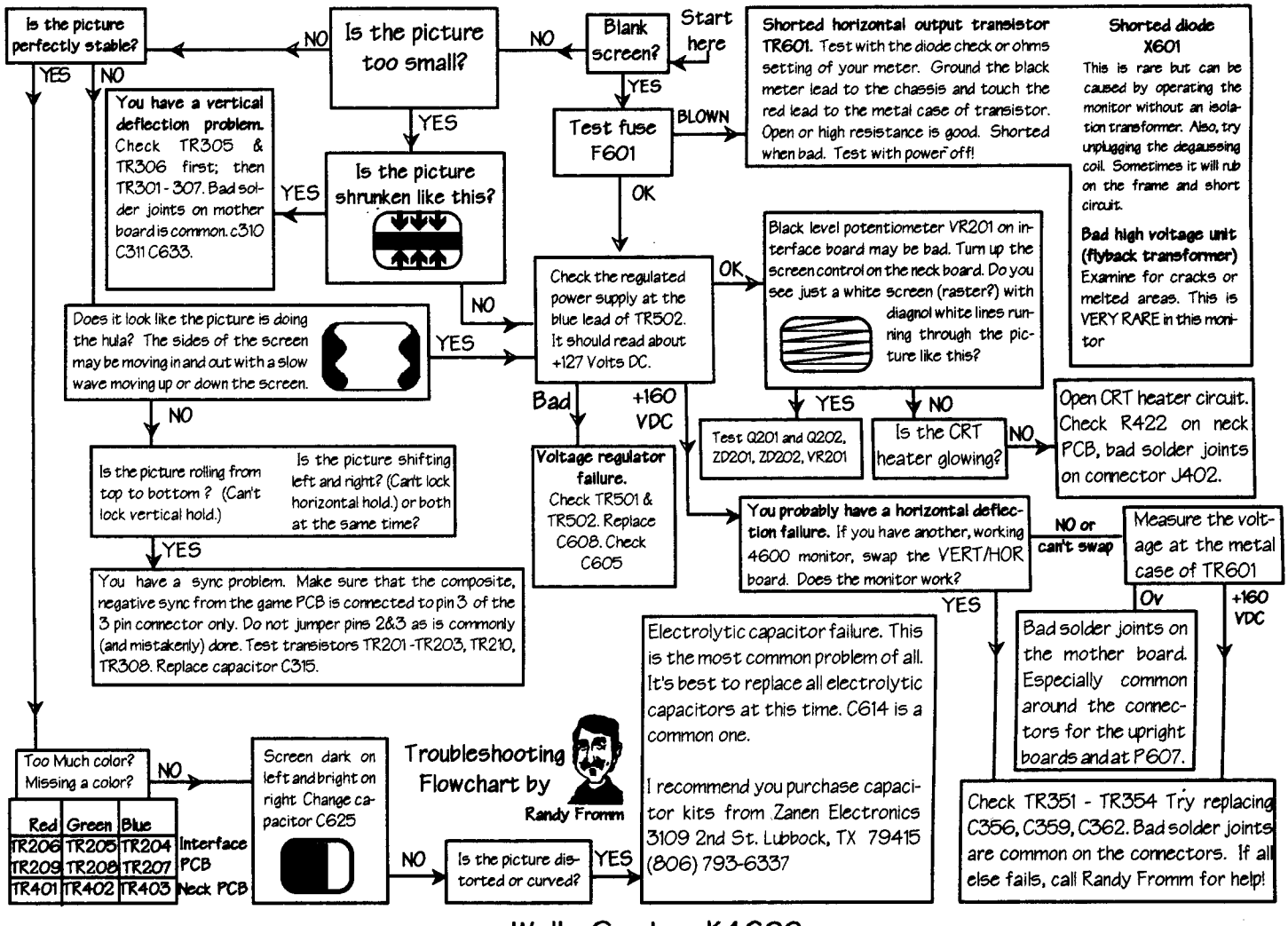
Fuse F902

Check the condition of F902 with the power turned off and your meter set to the lowest resistance (ohms) scale. F902 is the main AC power fuse and is located just in front of the 120 volt AC input wires on the back of the main PCB. Is the fuse good or bad (blown open)?

If the fuse is blown, you probably have a bad bridge rectifier (diodes D901 - D904). The degaussing coil that surrounds the picture tube may also be shorted to the chassis. Sometimes the coil chafes against the metal frame. Unplug the degaussing coil and see if the problem goes away. If it does, you've found your culprit! Both of these problems are rare.

Regulated Power Supply

Check the output of the +120 VDC power supply. This is also known as the "B1" supply or the "B+". The easiest place to check the output of this supply is at the far end of resistor R1.



Wells-Gardner K4600

R1 is the 220 ohm, 25 watt resistor that is mounted on the same black heatsink as the power regulator. This heatsink is on the left side of the chassis as you view it from the rear of the monitor. Is the output voltage ok? Is it too low? Is it too high?

If the voltage is too high (around +160 VDC) the horizontal deflection circuit is probably not working. The horizontal deflection circuit may actually be perfectly okay. The X-ray protector circuit may have shut down the circuit. To isolate the problem further, unsolder and remove transistor X701, the X-ray protector transistor. With the transistor out of the circuit, fire the monitor back up. If the screen now comes on, your horizontal deflection circuit is working. You have a voltage regulator failure or capacitor C511 is bad.

If the screen is still blank and the voltage is still around +160 VDC, you have a bona fide horizontal deflection failure. First, look for bad solder joints. Look carefully around the pins of the flyback transformer. Look for cracks in the PCB too.

If you don't see anything, check the voltage at the collector (the metal case) of the horizontal output transistor, X01. If you get a reading of 0 VDC, you've missed something. Look again for cracks and bad solder joints. If you have +160 VDC on the collector of X01, test transistor X501, look for bad solder joints on transformer X501 and/or try substituting integrated circuit IC501 with one you know to be good. If you still can't get it, call me and I'll be glad to help you out on the telephone.

Voltage Regulator Failure

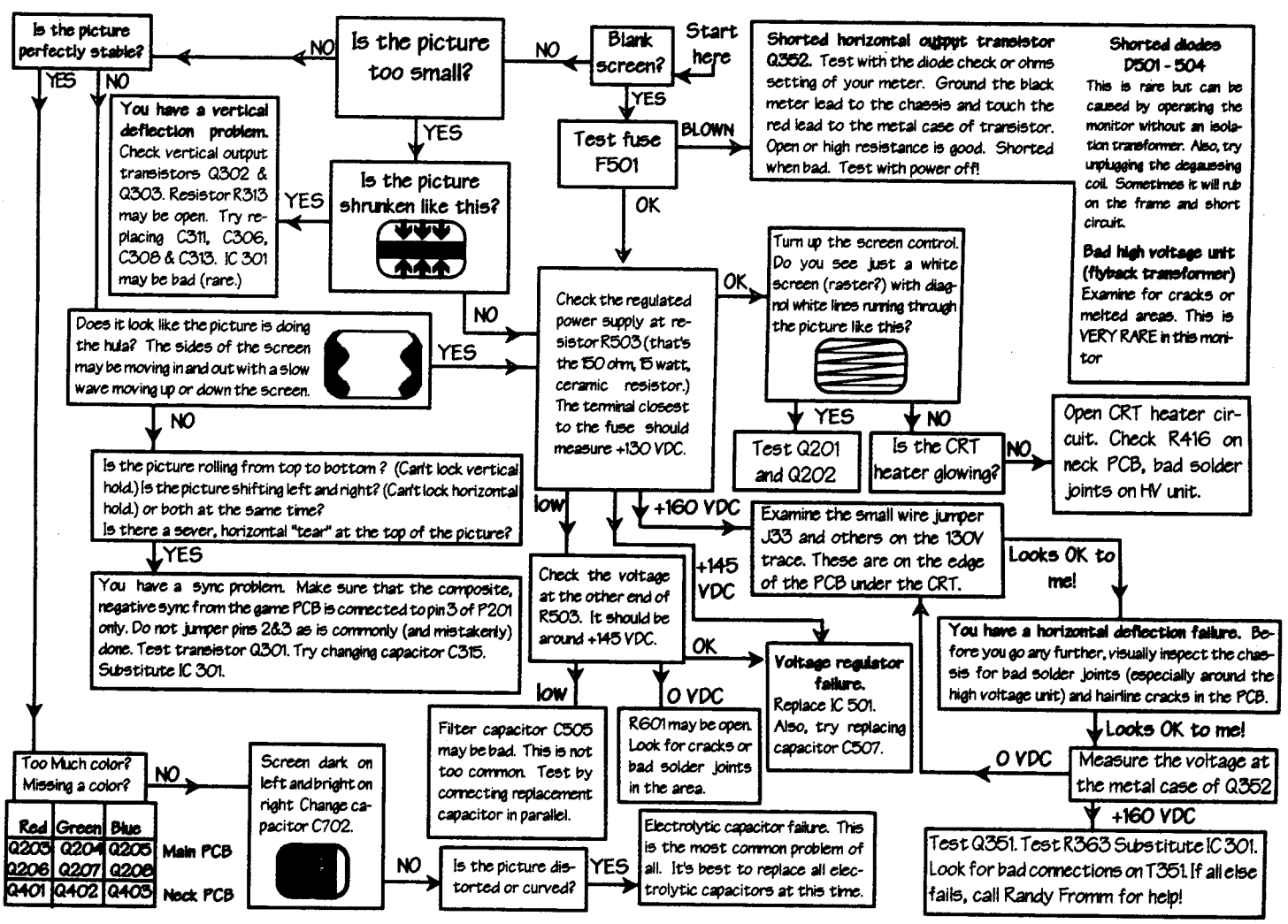
With the exception of the power regulator transistor itself (X04) all of the components in the voltage regulator circuit are designated with a "900" series number (X901, D905, etc.) "Check all 900s" means to test all of the components in the circuit. Start with the semiconductors (diodes, transistors) before moving on to capacitors and resistors.

Is The Picture Too Small?

Does the picture fill the screen from top to bottom, or is it squashed into a narrow, horizontal band? Is the picture shrunken on all four sides?

Stable Picture?

Is the picture rock steady or does it shake, jitter, roll, shift or do the hula? Try adjusting the horizontal frequency (horizontal hold) potentiometer and the vertical hold potentiometer. If



Wells-Gardner K4900

you can get the picture to slow down but never lock completely in place, you probably have a sync problem. A hula usually means a power supply problem.

Color Problems

There's not much to the color circuits in this monitor. You have three identical circuits here, so you can always compare the readings you get on the bad color to the other two. Any difference will point to the defective component. You can swap components between color amplifiers as well. For instance, transistors X101, X103 and X105 are all the same. So are X102, X104 and X106. The three video output transistors on the neck board are also identical.

WELLS-GARDNER K7000

The Wells-Gardner K7000 series monitor has pretty much been standard issue in video games since 1987. It has proven itself to be a reliable workhorse with a good reputation for performance and reliability.

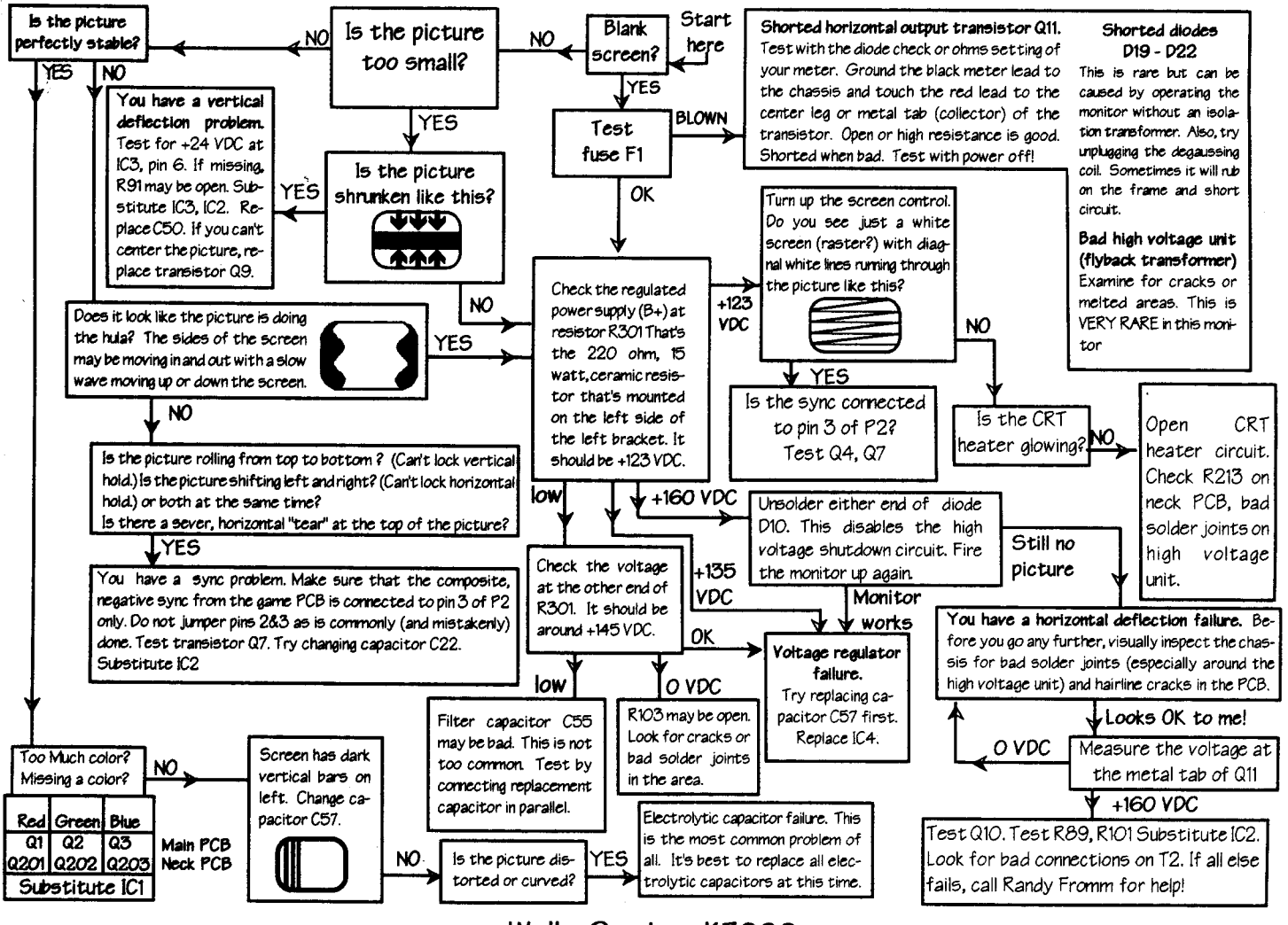
But after half a decade of continuous service, you can expect any monitor to develop an occasional failure of some sort. This troubleshooting flow chart should help you pinpoint the cause of most failures in the Wells-Gardner K7000 series monitors.

There are some problems that are very common in this monitor. They are:

Voltage regulator failure. IC4 is an integrated circuit voltage regulator. When it fails, it usually causes the B+ power supply (normally +123 volts DC) to rise. One of two things will happen. The picture will get a bit larger than normal and will shimmy and shake with a hula-like motion or the excess voltage may trip the "high voltage shutdown" circuit. If you hear the monitor make just a momentary, high-pitched squeal when you first apply power, IC4 is probably bad. This is one of the most common failures in this monitor.

Horizontal output transistor failure. This is a common failure in all monitors, not just the K7000. This is the only component failure that I have ever seen blow the fuse in this monitor. Follow the flow chart for instructions on testing this transistor.

Capacitor C57 failure (47 microfarads, 160 volts.) Always replace an original C57 when you're working on a K7000. Regardless of what your actual problem might be, this capacitor has such a high failure rate you might as well change it anyway.



Wells-Gardner K7000

Symptoms range from dark, vertical bars on the left side of the screen, to symptoms that closely mimic a bad voltage regulator. Increasing the voltage rating from 160 to 250 volts may extend the life of the replacement capacitor.

Bad solder joints on the high voltage unit. The monitor appears to be completely dead. There is no picture and you will not hear the high-pitched whine that is normally associated with a working monitor. The B+ (normally +123 volts DC) will measure about +160 Volts.

Bad CRT. You may see a purple arc in the neck of the picture tube. You'll hear it sizzling too. Another symptom of a bad CRT is excessive, uncontrollable brightness with poor focus. Try unsoldering and removing the three video output transistors on the neck board. Fire up the monitor with the neck board installed but the transistors removed. The screen should be completely black. If the problem persists, the picture tube is bad.

OTHER PROBLEMS?

Here are some other, not-so-common problems and fixes.

Repeatedly blows horizontal output transistor and/or fuse. Check or replace C36, C38, D18.

Insufficient vertical size (K7918). Add 47 ohm resistor in parallel with R80

Horizontal bending caused by insufficient sync level. Decrease R43 all the way to short if necessary.

Negative sync pulse does not drop to saturation level. Increase R106 (base of Q7) all the way to open if necessary.

To disable the shutdown circuit, remove D10 or short pin 5,IC2 to ground.

Ghosting or over-driving IC1 with 4V p-p or more. Add 470 ohm resistors in parallel with the emitter resistors in RGB amplifiers (R13, R14, R15.)

To obtain more down shift, parallel R83 with a 680 ohm resistor.

To shift up vertically, remove R83 or increase value.

Vertical foldover. D25, C48 (100 microfarad, 35 volt.)

Vertical foldover (K7401). Replace R107 with a 1.2K 5%

Vertical foldover when adjusting VR9. Change R107 to 1.2K. Short R121 on K7103.

Horizontal frequency off. Change Cl9 (5600 pf.)

To change the width, change the value of C38.

If you have vertical, colored lines, check emitter capacitors on the neck board (red-C201, green-C202, blue-C203.)

For more information on how monitors work and how to repair them, you might be interested in my videotape training program entitled "Videogame Monitor Repair Made Easy." For more information on this or other training books and videotapes, call toll-free at (800) 484-9892. When the computer asks for your code, press INFO (4636). For technical assistance, you can call me direct at (619) 593-6131 or FAX 593-6132.