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tips**

Tips For Using The CR7000 "BEAM-RITE"

This Tech Tip includes answers to some of the most common questions Application Engineering has received from the field. Any specific information not in this tech tip can be found in the CR7000 manual.

Finding The CRT In The Setup Book

When looking for a CRT in the setup book, there are a couple of things to keep in mind. The setup book does not list special endings such as TC01 or X01. These numbers refer only to special convergence characteristics of the tube and have no affect on the CR7000 setup. An example would be A34ADG12XX01. This would be listed as A34ADG12X. Some CRTs also have extra characters that are not part of the numbering standard. A common example would be MVA34ADG12X, this would also be listed as A34ADG12X.

Always Test The CRT First

Never assume a CRT needs to be restored based on a symptom alone. A defective chassis could cause poor brightness, contrast, or color tracking just as easily as a bad CRT. Before you restore a CRT with the CR7000, perform the first five tests on the function knob of the CR7000. This will save you from wasting time attempting to restore a CRT when the chassis is causing the problem. Additionally, restoring a good CRT could reduce the life of the tube.

Performing The Cutoff Test

During the cutoff test, the CRT is biased near electron beam cutoff which corresponds to the CRT's black level. The most common failure during the cutoff test is the inability to get one gun or all the guns into the cutoff area, even with the cutoff level knobs turned all the way up. This failure is caused by the center of

the cathode being slightly worn or contaminated. Some CRTs may still be able to produce an acceptable picture but some contrast range is lost when compared to a new CRT. When a CRT gun cannot be brought up into the cutoff box, you should perform the Extended Cutoff Test. See Table 1 for more details.

Performing The Extended Cutoff Test

Perform the Extended Cutoff Test by turning down the BIAS control until cutoff can be achieved. This decreases the negative bias on the CRT allowing more current to flow, therefore enabling you to see how bad the CRT's cutoff really is. It also sets a reference point for restoration. After each restoration is performed, you should always go back to the Cutoff Test to see if it has changed. If the cutoff improves or stays the same, more restoration can be done if necessary. If the cutoff drops after restoration, STOP RESTORING! Any further restoration will only damage the CRT at this point.

Checking Emission Levels

The Emission Test measures the amount of current that flows from the cathode (K) to the screen grid (G2) with zero bias applied to the tube. This allows the G2 voltage that was set during the cutoff test to pull maximum current from the cathode simulating white picture levels. The CR7000 uses an exclusive sliding good/bad emission scale, which changes with the bias voltage. This means that in order to get an accurate emission test, you must have the bias set to the level specified in the CR7000 CRT Setup Book. If you had to perform the Extended Cutoff Test, be sure to reset the bias control

Bar Graph Indication	Gun Tracking LED	CRT Condition	Likely Picture Symptom
All guns set to Cutoff area	Good	Good	Good low level contrast
All guns set to Cutoff area	Bad	Bad Lo Tracking	Color shading in grays
One or more guns stay below Cutoff area	N/A	Bad Cutoff	Poor contrast color shading in gray picture areas
One or more guns above Cutoff area and won't adjust down or drift slowly upward	N/A	Open G1	Uncontrollable bright white or color, chassis may shut down

Table 1: Summary of cutoff and Lo Tracking test results.

Bar Graph Indication	Gun Tracking LED	CRT Condition	Likely Picture Symptom
All guns good	Good	Good	Good brightness
All guns good	Bad	Bad Hi Tracking	Good brightness, color shading
One or more guns bad	N/A	Bad Emission	Dim picture, may have color shading

Table 2: Summary Of Emission And Hi Tracking Tests.

before performing the Emission Test. The most common symptom of a CRT with poor emission is a dim picture, however, many servicers have reported focus problems in high resolution monitors that have been fixed by improving the emission levels with restoration. The emissions should always be checked after any restoration is done, but always check the cutoff first. Refer to the Table 2 on top of the page.

Performing The Hi Tracking Test

If the relative emission levels of all three guns in a color CRT are not within specification, it will display poor color tracking. The result is a CRT with wrong colors or colors mixed in with the black and whites of a screen. CRT manufacturers specify that the strongest gun cannot produce 55% more emission

than the weakest gun when all three guns have the same G2 voltage applied to them. When the CR7000 Test Gun Select switch is set to "simultaneous", the HI TRACKING TEST is done automatically. If a CRT fails the Emission Test, it will also fail the Hi Tracking test. If you are testing projection CRTs, you will need to store the emission levels of each gun by pushing the "Press To Store" Emission button. Only after all three guns have been tested and stored can you get a valid Hi Tracking reading.

Tips On Restoring

The CR7000 has six levels of restoration and a REMOVE G1 SHORTS function. This allows progressive restoration to be performed. This simply means that only the smallest amount of restoration needed to improve a CRT is used, preventing

unnecessary damage to the tube caused by over-restoring. Always start at the Re-Activate function and test for cutoff and *emission* before going to a higher level. Performing these steps will tell you what kind of reaction the tube is having to restoration and how much further restoration will be needed. Some tubes will have a large response to Re-Activate while others will need much higher levels to respond.

Common Mistakes To Avoid

1. The Re-Activate, High, and Extended modes of restoration boost the filament voltage while they are being performed. Be sure to let the filament cool off a few seconds before going back to the tests. A hotter than normal filament will give you a higher than normal cutoff and emission reading causing you to think your tube may be in better condition than it really is. This can cause under-restoration which may result in a tube returned for the same original symptoms.
2. Never restore a tube that tests good. Occasionally a simple Re-active can clean up a tube that tests close to the good/bad line for emissions, but nothing more than that should ever be done to a gun that tests in the green.
3. Never apply power to the TV chassis with the CR7000 still hooked up!

**For more information,
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