

Determining the Setup of CRTs Not Listed in the CR70 Setup Book

The CR70 Setup Book is updated yearly from many sources such as registration data from the Electronics Industry Association (EIA), manufacturers, and customers. Occasionally you may still encounter a CRT that is not listed in the CR70 Setup Book for several reasons.

First, the CRT number may have an "MV" prefix (MVA63AEH20X) or a "TC" ending (510DSTC01). An "MV" indicates the tube has new construction. To find the listing in the Setup Book, drop the "MV" and look for the remainder of the number. "TC" indicates a color CRT that has a bonded yoke construction. Replace the "TC" ending with "P22" and recheck the setup book listings.

Secondly, the CRT may have a non-standard designation number. The CRT's manufacturer, or the manufacturer of equipment using the CRT, may assign a part number that differs from standard listings. Though it is not possible to maintain a complete listing, the Setup Book lists some of these special CRTs at the end of the standard listings.

Lastly, the CRT may have been registered after the new setup book was compiled.

Regardless of why the CRT is not listed in the setup book, it can be tested, and restored with the CR70 if you know the proper gun setup. A gun setup for the CR70 requires:

- 1) A socket that fits the CRT (or U/A).
- 2) The amount of negative bias.
- 3) The filament voltage.
- 4) Determining which pins on the CRT are the F1, F2, K, G1, and G2.

NOTE: Color tubes have 3 guns and require 3 different gun setups; black &

white tubes have 1 gun and require a single gun setup.

1. Finding a Socket That Fits

Finding the proper socket to test the CRT is easy; you simply find the CR70's supplied Adapter Socket that physically fits the base of the tube. Once you have connected a socket, the socket's wiring is made to match the pin elements of the tube using the CR70's Individual Gun Setup and CRT Preset Control switches.

To properly fit the CRT the opening of the CR70 socket must line up with the keyway

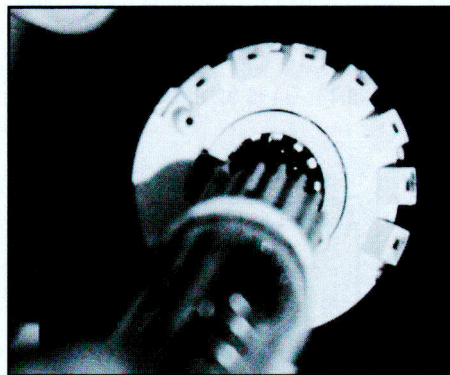


Fig. 1: The opening on the CR70 socket should line up with the keyway on the CRT base.

on the tube, as shown in Figure 1. Note that some sockets (sockets 7 & 9) have some pins removed. These are the focus pins and are not needed to test the CRT. They have been removed to allow the same adapter to work for different variations in CRT sockets.

If none of the socket adapters fit the tube, use the Universal Adapter (UA). Be sure to carefully follow the procedure in Tech Tip 129, "Learning to Test CRTs With the CR70's Universal Adapter" when connecting the Universal Adapter.

2. Determining Bias

You must correctly bias the CRT to properly test its dynamic range. The tube's negative bias is equal to the difference between the DC cathode voltage and the DC G1 voltage. Figure 2 shows three voltages on the cathodes.

Use the lowest DC voltage of the 3 cathodes. In this example, the blue cathode is 187 VDC and G1 is 0 VDC. Subtracting the two voltages, the negative bias equals 187 VDC. Color tubes often

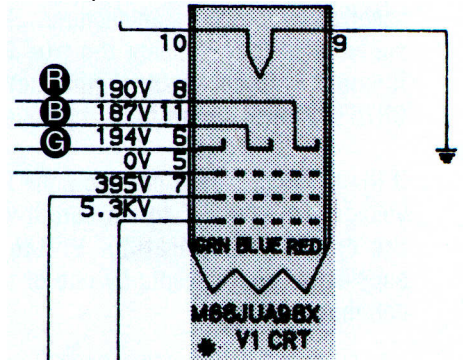


Fig. 2: To determine negative bias subtract the DC cathode voltage from the DC voltage on G1. (0 - 187 or -187 V as shown here).

require a -68 or -52 bias setting, and black & white tubes often require a -36 or -20 bias. If either the voltage indicated on the schematic or the measured value is greater than -68, use "-68V" bias. Table 1 shows what bias settings to use.

Bias (G1-K) Voltage (schematic or measured)	CR70 Bias Control setting
68 and above	-68
67-52	-52
51-36	-36
34 and below	-20

Table 1: Use these voltage limits to set the CR70's BIAS control.

If the schematic does not show the bias voltage you can measure the bias voltage with the tube in operation. To measure the voltage in-circuit apply a black video pattern to the CRT and measure the voltage difference between the cathode and G1. (A suitable black pattern can be produced using the VA62A or VG91's Multiburst Bar Sweep pattern with the Interrupt Buttons in the out position.)

NOTE: If the chassis has a defect that produces a blank raster the measured bias may be wrong due to problems in a stage other than the CRT.

3. Determining Filament Voltage

The voltage on the filament heats the cathode to to a specific temperature. For this reason true RMS voltage is important. (True RMS is an effective AC voltage that produces the same heating effect as the same amount of DC voltage). CRTs usually operate at 6.3 or 12.6 VRMS.

The CR70 supplies a DC filament voltage which agrees with the AC RMS voltage specified by the CRT manufacturer. Some schematics may indicate the true RMS filament voltage. If so, simply set the CR70's filament supply for that amount.

If the schematic does not show the RMS voltage you will need to measure it while the chassis is operating. Voltage is supplied to the filaments by one of three common methods.

Most commonly the filaments are powered by a pulse taken from a winding on the flyback. Schematics usually reference this filament voltage in peak-to-peak, as shown in Figure 3. If so measure the voltage with a true RMS meter while the chassis is operating.

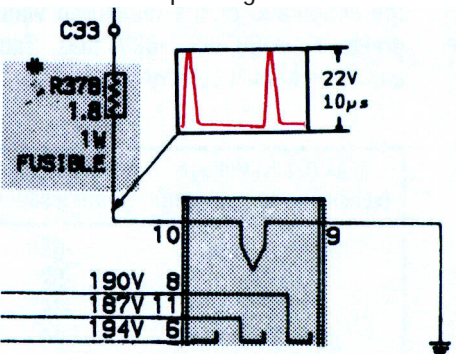


Fig. 3: Schematics often reference the filament voltage in peak to peak voltage. Measure the voltage with a true RMS meter.

Some chassis may use a winding off the AC power transformer to supply the filament voltage. Again, use a true RMS meter to determine where to set the CR70 filament voltage.

A few chassis use DC voltage to power the CRT filaments. In this case simply measure the DC voltage at the filament pins with a DC voltmeter.

4. Locating the Pin Elements

The CR70 requires five connections to the electron gun. They are:

- Heaters - F1 & F2 (2 connections)
- Cathode - K (3 cathodes for color CRTs)
- Control grid - G1 (color CRTs may use 1 common, or 3 separate G1's)
- Screen grid - G2 (color CRTs may use 1 common, or 3 separate G2's)

The CR70 Adapter Socket is the interface between the CR70 and the tube. The CR70 setup switches select the connections to the pin elements on the tube.

Most schematics identify the pins by a schematic symbol for each element. For example, Figure 4 shows the filament pins are 9 & 10; the RK is 8; the GK is 6; the BK is 11; G1 is 5; and the G2 is pin 7.

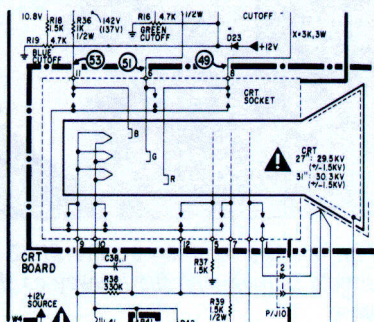


Fig. 4: Schematics identify elements by a schematic symbol and pin number.

If the schematic does not list the pin numbers check the CRT drive circuit board to see if the CRT element legend is screened on it.

When counting pins always start at the keyway or focus pin and count clockwise when looking at the CRT base. (Pins pointing towards you). The first pin clockwise from the keyway or focus pin is #1. (A keyway is a notch on the plastic or ceramic assembly in the center of the pins.)

If there is no keyway count the focus pin as pin 1 and continue counting clockwise from it. The focus pin is set off by itself and is often shielded by a plastic barrier.

Count all empty pin positions as pins, including the space taken by the plastic focus barrier. Figure 5 illustrates a keyway notch and focus barrier, and shows how the pins should be counted.

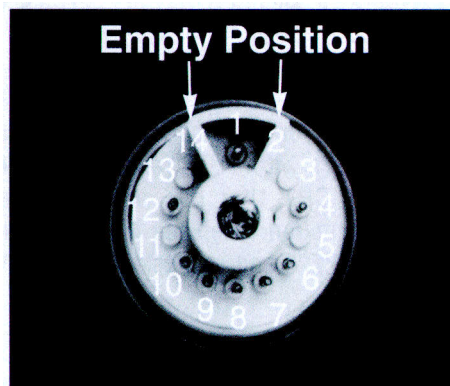


Fig. 5: Examples of pin numbering.

After you have identified the pins you are ready to set the CR70 switches. Using the schematic in Figure 4 as our example, the filament pins are 9 & 10, so set the CR70's "F1" switch to 9 and "F2" switch to 10. The cathodes are pins 8, 6, and 11, so when testing the red gun set the "K" switch to 8; to test the green gun set the "K" switch to 6; and to test the blue gun set the "K" switch to 11. The control grid pin is 5, so set the "G1" switch to 5. The screen grid pin is 7, so set the "G2" switch to 7. You are now ready to test and restore the CRT as necessary.

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