WHITE BALANCE

1. Equipment Required: An oscilloscope with a DC coupled mode in the vertical amplifier.
2. Referring to Fig. 1 and 3, do the following adjustments in subdued light after degaussing and setting the purity of the CRT.
3. Ground the R/G/B video inputs. Apply sync signals to the sync inputs.
4. Set all three drive controls, VR202, VR204, & VR206, to their midpoints of rotation.
5. Set the screen and R/G/B cutoff controls to their minimum (fully CCW) positions.
6. Connect the oscilloscope to the collector of a video output transistor Q201, Q202, or Q203 or to the end of R207, R208, or R209 indicated on Figure 3 as Red, Green, or Blue.
7. If this white balance procedure is required because the CRT or neck board was replaced, then leave the contrast control at its original setting. If the contrast control is known to be grossly out of adjustment, then set it to its center of rotation. Adjust the brightness control VR6 to obtain the waveform shown in Figure 10. Now remove the scope probe.

8. Slowly turn the screen control CW until the raster is just visible. The color of this raster is called the lead color gun. DO NOT adjust its associated cutoff control. It must remain fully CCW.
9. Adjust the screen control CCW until the raster is just extinguished.
10. Adjust the brightness control for a dim raster. Adjust the two remaining cutoff controls (NOT the lead color gun cutoff control) for best gray uniformity.
11. Adjust the brightness control for a bright raster but not maximum brightness. Adjust the R/G drive controls, if necessary, for best neutral white. Try not to adjust the blue drive control.
12. Repeat steps 10 and 11 until good tracking of white balance is achieved. End with step 10.
13. With the oscilloscope connected to the collector of the lead color video output transistor (See Fig. 3), adjust the brightness control to obtain the waveform in Fig. 10.

BLANKING PULSES

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103 V

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0 - VDC

FIG. 10
TYPICAL OSCILLOSCOPE WAVEFORM PATTERNS

The waveforms shown below were observed on a wide band oscilloscope. The input signal was from a crosshatch generator with a horizontal sync frequency of 15.73 kHz and a vertical frequency of 60 Hz. If the waveforms are observed on an oscilloscope with a limited high frequency response, the corners of the pulses will tend to be more rounded than those shown, and the amplitude of any high frequency pulse will tend to be less.

Each photograph is numbered. These numbers correspond to the circled numbers on the schematic diagrams.

Photographs 12, 13, 14, 15 and 16 are of the red signal at various points along the red video channel. The waveforms at corresponding points along the green and blue video channels will look similar.
TROUBLESHOOTING NOTES

1. The troubleshooting chart mentions specific components to be checked. It is intended that the entire circuit associated with these components be checked.

2. This chart is a guide to servicing rather than a complete list of each component that could fail. Therefore, troubleshooting should not be limited only to those components mentioned in the chart.

3. It is always useful to begin checking a circuit by measuring the DC voltages and then comparing the measurements to those listed in the Typical DC Voltages chart.

4. The cutoff controls and drive controls on the neck board and the screen control at the bottom of the flyback transformer have been preset at the factory. When servicing the monitor for a lack of video, do not adjust any of these controls unless it is suspected that the problem is a result of these controls having been tampered with. Otherwise do not adjust these controls; if they are so severely out of adjustment that there is a lack of video, then there is something malfunctioning.

5. The Wells-Gardner Service Department does accept telephone calls for servicing assistance. Call 1-312-252-8220, between 7:00am and 3:30pm Central Time. Ask for the Service Department. The Service Department is closed during the first two weeks of July. Telephone assistance is not available during this period. Before calling, be sure to have available the model number of the monitor being serviced and the schematic diagram of the monitor being serviced.

6. Replacement parts may be ordered from the Service Department between 7:00am and 4:30pm Central Time.

7. All monitors are equipped with automatic degaussing coils which demagnetize the picture tube every time the monitor is turned on after being off for a minimum of 20 minutes. Should any part of the chassis become magnetized it will be necessary to de gauss the affected area with a manual de-gaussing coil. Move the coil slowly around the CRT face area and all surrounding metal parts. Then slowly withdraw for a distance of 6 feet before turning off.

8. Horizontal vs. Vertical:
   Some models have the picture tube mounted vertically rather than horizontally. That is, the picture tube is mounted in the frame such that the long dimension of the tube is up and down. Examples of this include (but are not limited to) Models 13K7851 and 19K7951. Other than the physical orientation of the picture tube, there is no electrical difference between these models and their horizontal counterparts. The same circuits, the vertical circuits, produce and control deflection along the short dimension of the tube in all models.

   The same circuits, the horizontal circuits, produce and control deflection along the long dimension of the tube in all models. Therefore, wherever “vertical” appears in this manual or on the monitor, it refers to the short dimension of the picture tube; wherever “horizontal” appears, it refers to the long dimension of the picture tube.
Figure 12  PC Board Layout P456  (View of Component Side)

Figure 13  PC Board Layout P448  (View of Component Side)