



WG-309A MICROSCOPE

For Observing "Register" In Color Picture Tubes

RCA WG-309A Microscope is a low-power instrument having a magnification of approximately 20X. It is useful in obtaining optimum color purity because it permits direct observation of "register"—i.e., the areas of the phosphor dots ex-



cited by the electron beams—at any portion of the screen. In making convergence adjustments, it is important to know what the relationships are of the excited areas to their appropriate phosphor dots. When the beams are properly converged, the excited areas are "registered" in the phosphor dots. The microscope is provided with an outer sleeve which permits focusing the instrument in a manner similar to that of a telescope. The overall length of the microscope with the barrel retracted is 7-5/16"; with the barrel fully extended, about 12 inches. The WG-309A weighs approximately 12 ounces.

How to Use The WG-309A

To use the WG-309A for observing "register", slowly pull the inner barrel from the outer sleeve until the barrel is nearly all the way out. Be careful not to pull the barrel completely out of its sleeve. With the microscope in its fully extended position, place the sleeve against the safety glass of the color TV receiver. While looking through the eyepiece, slowly push the barrel toward the safety glass until the energized color dots appear. Reposition the barrel slightly, if necessary, to bring the color dots into sharp focus. To observe excited areas in relation to their appropriate phosphor dots, illuminate the dots by shining a light from a flashlight or other

portable low-power source upon a section of the dot screen close to the microscope sleeve. The energized portions of the phosphor dots will then show up as bright colored spots on a dull-colored background. **Warning:** Because personal safety considerations require that neither the operator nor any piece of equipment come in contact with the picture-tube faceplate during setup adjustments, microscope observations of "register" should always be made through a safety glass or similar protective shield.

Fine Adjustment For Color Purity

To achieve optimum color purity, it is necessary that the trio of electron beams center approximately or "register" on the associated phosphor-dot trios. Figure 1 shows a typical phosphor-dot trio with the electron-beam trio properly "registered". The phosphor-dot trio is shown in an inverted position, as seen through the microscope. Also shown in Figure 1 are the imaginary center points for the three electron beams and the phosphor-dot trio. The term misregister is used to describe the condition which exists when the imaginary center point of the electron-beam trio does not coincide with the imaginary center point of the associated phosphor-dot trio.

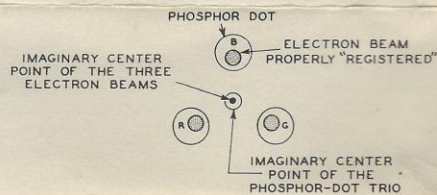


Fig. 1 - Typical phosphor-dot trio with the electron-beam trio properly "registered".

Radial misregister exists when the electron-beam trio has moved toward or away from the center of the picture-tube screen. That is, the center of the electron-beam trio lies on the same radius as the center of its associated phosphor-dot trio but the centers do not coincide. Radial misregister may be either uniform around the screen periphery or localized to small areas. A typical example of radial misregister is shown in Figure

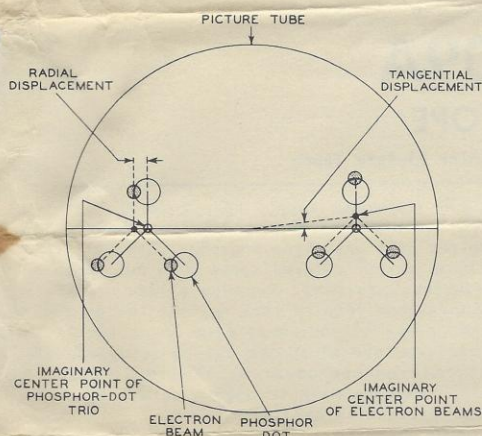


Fig. 2 - Tangential and radial misregister

Tangential misregister exists when the imaginary center point of the electron-beam trio and the imaginary center point of the phosphor-dot trio, as shown in Figure 2, are equidistant from the center of the picture-tube screen but do not lie on the same radius. The electron-beam trios may be misregistered in either or both radial or/and tangential directions.

Procedures

Before making the following adjustments with the aid of the WG-309A Microscope, it may be necessary in some color receivers to make initial static-convergence, dynamic-convergence, and color purity adjustments, as described in the appropriate color-TV service notes.

1. Examine the electron-beam trio landing patterns (register) at the center of the picture-tube screen. The relative positions of the dots in a phosphor-dot trio should appear as shown in Figure 3a. Other typical landing patterns obtained as a result of improper initial purity adjustments are shown in Figures 3b and 3c.

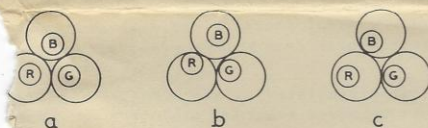


Fig. 3 - Typical register patterns at the center of the picture-tube screen after initial color-purity adjustment.

2. Rotate the purifying magnet around the neck of the tube and adjust the relative posi-

tions of the purifying-magnet tabs until the beam-landing pattern conforms as nearly as possible to that shown in Figure 3a.

Rotation of the purifying magnet causes the electron-beam trio to move in a circular path as shown in Figure 4. The relative positions of the purifying-magnet tabs determine the diameter of the circular path. By properly adjusting the purifying magnet, it is possible to position the three electron beams so that they land directly in the center of the associated phosphor-dot trio.

3. If the landing patterns of the electron-beam trio in the center of the screen do not conform closely to the pattern shown in Figure 3a, repeat the static-convergence adjustments and steps 1 and 2.

4. Examine the electron-beam landing patterns around the periphery of the picture-tube screen for radial misregister. If the three electron beams are radially displaced, as shown in Figure 2, move the deflecting yoke axially along the neck of the tube toward the picture-tube screen. This adjustment will cause the electron beams to move radially toward the center of the screen. Conversely, movement of the deflecting

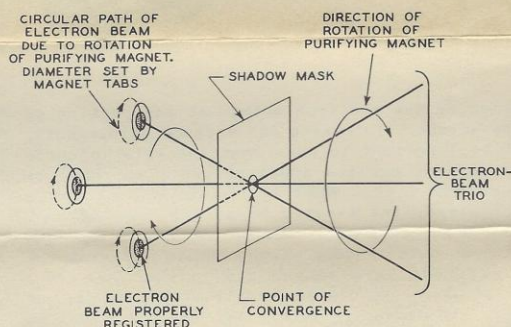


Fig. 4 - Circular movement of the electron-beam trio produced by rotation of the purifying magnet.

yoke toward the base of the tube will cause the beams to move radially toward the edge of the screen. Carefully position the deflecting yoke until the electron-beam trio lands as close as possible to the centers of their associated phosphor-dot trios.

5. If necessary, refer to the appropriate color-TV service notes and make the final adjustments for centering and for obtaining a white raster. Repeat the static and dynamic-convergence adjustments to insure optimum registration.

6. Examine the electron-beam landing patterns at the edges of the scanned area. If the electron-



beam trio is not registered properly, this condition may be due to tangential or radial misregister as shown in Figure 2. If necessary, adjust the individual field-equalizer magnets in the magnetic-field equalizer assembly, mounted around the rim of the kinescope screen, to correct for tangential and radial misregister. The path which the electron-beam trios describe, and the adjustments necessary to register the electron-

beam trios in the center of the phosphor-dot trios are shown in Figure 5.

Refer to the appropriate color-TV service notes for adjusting the individual magnets in the magnetic-field-equalizer assembly. Observe the beam-landing patterns and adjust the individual field-equalizer magnets until proper registration is obtained at the edges of the scanned area. If necessary make final adjustment with the aid of the microscope.

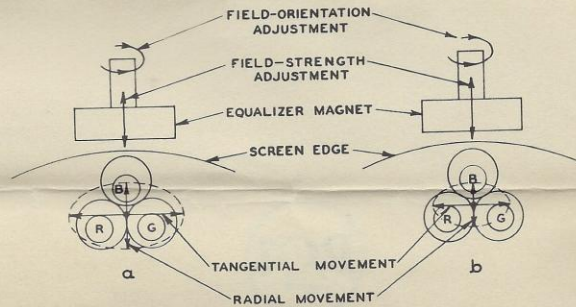


Fig. 5 - Effect of equalizer-magnet field strength on shift in path of electron-beam trio (a PM equalizer magnet is shown): a - maximum field strength; b - less than maximum field strength. Direction of shift is determined by orientation of magnet poles.

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