***Busier than beavers, the electrons in a color TV set have to do a complex series of jobs with dazzling speed and precision. Here is how their dance brings you the big show.***

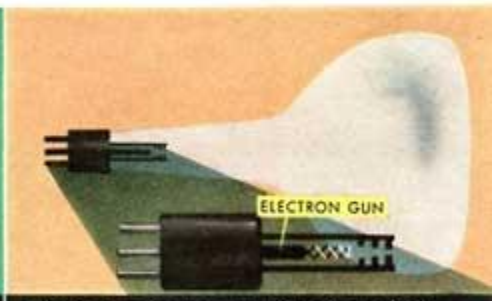
# How color television works

WITH the cost of color TV sets creeping downward, this may well be the season when full color entertainment really takes over U.S. living rooms. One manufacturer (RCA) already is offering a color receiver for less than $500. Color programs are on the increase, with many more scheduled for next year. Manufacturers who held back are now gearing their plans to include full-scale color-set production.

If you're a black-and-white TV owner and viewer (as 90 percent are), you've probably wondered why color TV has taken so long to arrive. As the picture story on this and the two following pages shows, color TV is a complex affair, needing complicated cameras, transmitters, receivers, and picture tubes.

In effect, a color TV receiver has to do three times the job of a black-and-white set. It must make up pictures, not just of lights and darks, but of the three primary colors of transmitted light—red, green, and blue. And do it at enormous speed and with high precision.

The same kind of material glows on the walls of a fluorescent lamp as on the face of a picture tube.




This is an electron gun that shoots high-voltage electrons at the phosphor screen on the TV picture tube.

**1 A BLACK-AND-WHITE TV TUBE** has a "screen" of a phosphorescent material or "phosphor." Like the coating in a fluorescent lamp, the phosphor glows white when it is hit by electrons.

**2 BEAM OF ELECTRONS,** produced by the electron gun in the neck of the tube, is shot at the phosphorescent screen. Wherever the beam hits the surface, the phosphor coating glows.

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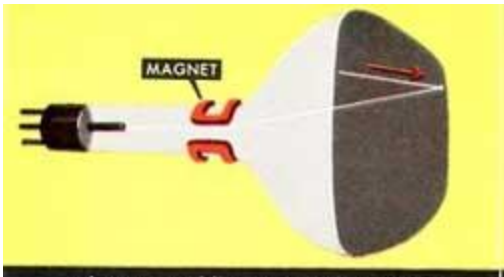
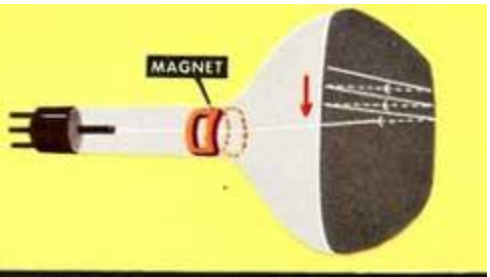



The top and bottom poles make the electrons move from left to right.




The horizontal magnet poles move the electrons to a new position to start a new line.

**3** **TWO MAGNETIC FIELDS** are used to move the electron beam back and forth and up and down. A vertical magnetic field (above) moves the beam back and forth horizontally.

**4** **HORIZONTAL MAGNETIC FIELD** moves the electron beam up and down. Combined, the two fields cause the beam to "scan" the face of the tube with a series of horizontal lines.


The color TV tube has three electron guns, one for each primary color.


The electron gun that aims at red dots can hit only those colors.

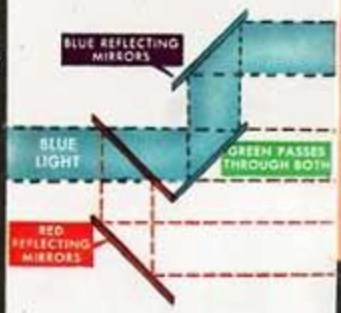
**7** **THREE ELECTRON GUNS** are built into the neck of a color television tube. Each gun is controlled by one of three color signals and produces a separate beam of electrons.

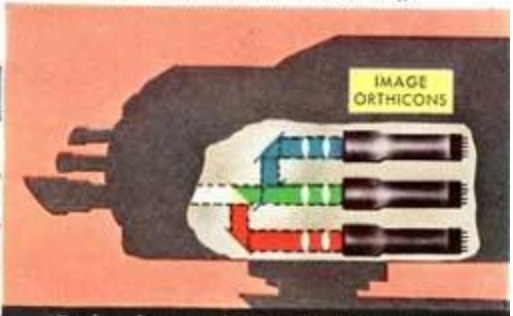
**8** **MICROSCOPIC HOLES** in mask behind tube's screen are so arranged that the "red" beam hits only red-glowing dots, "blue" beam hits only blue dots, "green" beam only green dots.

**11** **MIRRORS IN OPTICAL SYSTEM** have a special coating that reflects some colors, and allows others to pass through. This produces three light paths: red, green, and blue.

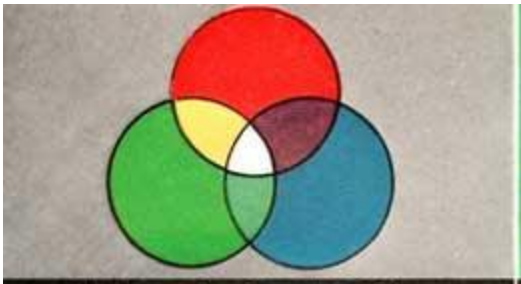
**12** **EACH LIGHT PATH** is focused on one of three separate camera tubes. One tube picks up the red image, the second tube the green image, and the third tube the blue image.

The specially coated mirrors pass some colors and reflect others.




Each color is picked up by a camera picture tube called an image orthicon.

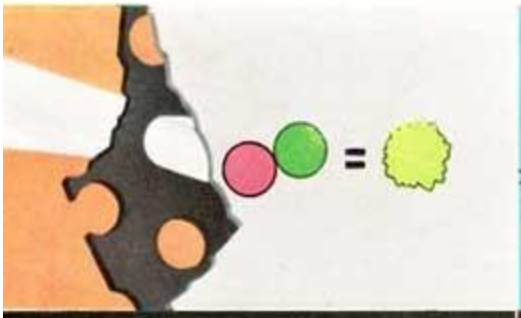


The three colors form white. Different amounts of each color form all the other colors.

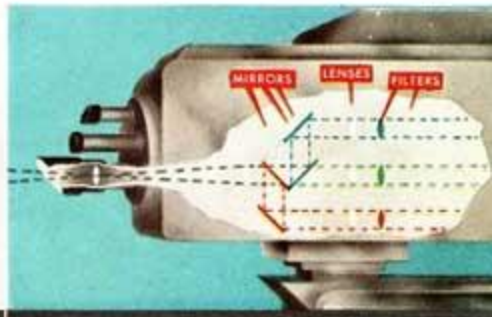

The three colors are arranged in groups of phosphor dots, one for each primary color.

**5** **COLOR TELEVISION** makes use of the fact that all colors, including white, can be produced by mixing, in varying amounts, the three primary colors for transmitted light.

**6** **A COLOR PICTURE TUBE** has a coating made up of three phosphors that glow in color—one red, one green, one blue. These are arranged in groups of three on the face of the tube.



If one color is stronger, the yellow will appear greenish. All shades result from the different brightness of each color.



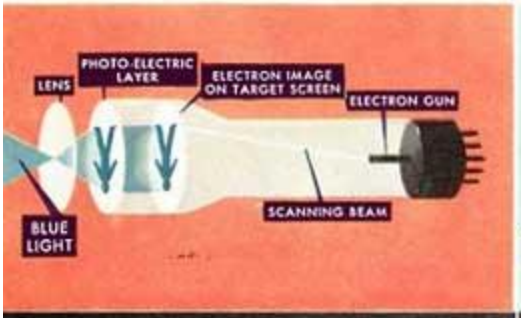

The light is broken up into the three primary TV colors: red, blue and green.

**9** **GLOWING COLORED DOTS** on the screen, too tiny to be seen by the human eye, fuse and blend together, like the dots in these color engravings, to produce the right color.

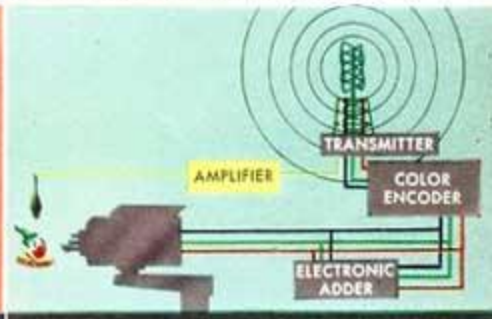
**10** **STUDIO CAMERA** has an involved optical system made up of mirrors, lenses, and filters to break down the colors in the scene being televised into the primary colors.

**13** **CAMERA TUBES SCAN IMAGES** with electron beams to produce color signals. The "red" tube produces "red" signal, the "green" tube "green" signal, the "blue" tube "blue" signal.

**14** **COLOR CAMERA** feeds three signals to a color encoder. This combines the signals to produce complex color information signals for transmission. Sound signal is separate. END




Each camera tube scans only the color it receives. The colored light changes to electrons in the tube.




Each color is a separate signal. Sound signals go along as FM signals.

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