How You'll Get TV Colorcasts

Color broadcasting has been started—here are answers to your questions about it.

By Devon Francis

COLOR television broadcasts—colorcasts—have been started. They are on the air a few hours a week.

For the moment they are confined to the New York area. Before the turn of the year some programs will be networked to Chicago. On January 1, Pasadena's Tournament of Roses and the Rose Bowl football game will be networked in color.

Dozens of TV stations throughout the country are getting ready to carry network shows in color. More will follow.

The owners of 24,000,000 TV sets in black-and-white are asking, "When can I get color TV?"

The answer to that question, and to others on the coming boom in colorcasts, follow:

When can I get a color set?

Next year, if you're lucky. Manufacturers probably will make 50,000 sets by next fall. After that, production ought to climb rapidly.

What will it cost me?

From $800 to $1,000 at the start, according to RCA, sponsor of compatible color TV. Production will drop the price. Color sets probably always will cost half again as much as black-and-white sets.

What do you mean by compatible?

That colorcasts can be received as black-and-white on your present set.

Can I change my present set to receive color?

Yes. Estimates on conversion costs by the manufacturers themselves run from 30 to 90 percent of the price of a new color set.

When will my local stations begin colorcasting?

More than 55 TV stations already have signed up for network color. Dozens more will follow in the next few months. But few will put their own color programs on the air in the first year—color cameras and related equipment will be scarce for a while.

When will the rest of the country get color TV?

That will depend on how fast the stations can obtain the equipment. Any station now telecasting in black-and-white can modify its equipment to accept colorcasts from the networks. It will also depend on how fast the telephone company's equipment—necessary to networking TV—

is adjusted to carry color. The Southwest, Northwest and mid-South, exclusive of coastal areas, have few TV stations as yet.

How good, actually, is the color?

It's fine. A public survey made by RCA-NBC during one phase of the development work showed that most viewers were delighted with it. To the question, "How do you feel about the over-all quality of the color television pictures you have seen?" 98 percent responded that it was excellent, very good or good. About the same number said the detail was clear. Three-fourths of the viewers thought the colors were about right, one-fourth that they were too vivid.

The handful of people who didn't like color TV said the pictures were fuzzy or that the colors weren't true.

How will I operate a color set?

On present models, the same as you do your black-and-white set. There's one more control. Turn it far left, and all color is drained from the picture. Turn it far right, and the colors are "saturated," with reds predominating. In between, you adjust the set for as much color as you want. Eyes differ.

How big will the picture be?

To start, 14 inches. Bigger tubes are planned.

What will be the size of the cabinet?

About that of your present one except that it will be a few inches deeper to accommodate a longer kinescope.

Will I need a different antenna?

No, but your antenna installation should be good.

What will it cost me to replace a bad color tube?

Until they begin manufacturing tubes in the millions, probably upward of $250.

Will the repairman charge me more to fix my color set?

Probably, it's more complicated.

Will color eventually obsolete my present set?

Only if you insist on having color. The experts say there will always be telecasts in black-and-white. What would color add to the Friday-night fights and dozens of other programs devoid of color?

How good is black-and-white reception from a colorcast?

Excellent. Most viewers say it's better than regular black-and-white reception. Color pictures have a better "half-tone rendition" than black-and-white. You can detect little spots embedded in the scanning lines if you get too close, though. Those are created by the color sub-carrier in the colorcast. Except for them, your present set will "ignore" the color signals.

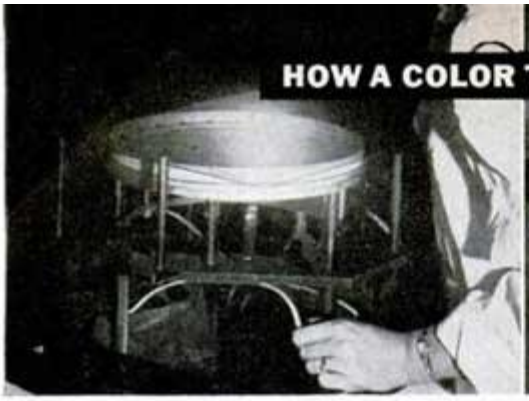
What makes the color in color TV?

TV colorcasts still depend on a standard black-and-white signal. But the color camera separates what it "sees" into three color images. They ride on an additional signal, or wave —the sub-carrier referred to above.

This is sandwiched in between the frequencies assigned to the TV black-and-white picture and the sound frequency. Actually, the color signal sort of rides piggyback on the black-and-white frequency. When the signals reach your color set, having the same number of scanning lines (525) as your present set, they will be converted into color indications on

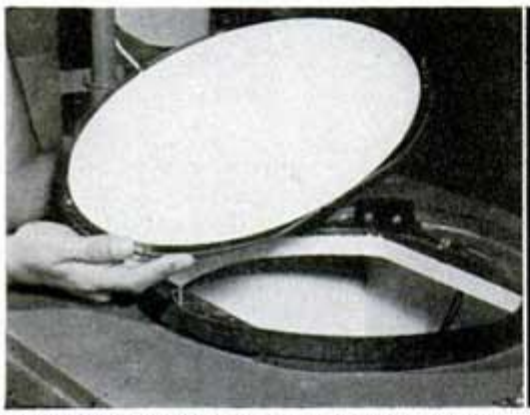
[Continued on page 266]

HOW A COLOR TV TUBE IS MADE



1 PHOSPHORING the face of a developmental color TV tube for a home receiver starts in darkroom. Design of shadow mask—through which electron guns shoot at colored phosphors to produce picture—is photographed on sensitized glass.

2 SHEET OF GELATIN next is laid on negative plate. Exposed to ultraviolet light, it hardens except where 200,000 tiny dots on negative obstruct the light. Soft gelatin behind the dots is dissolved out with water, leaving a stencil for phosphoring the tube face.

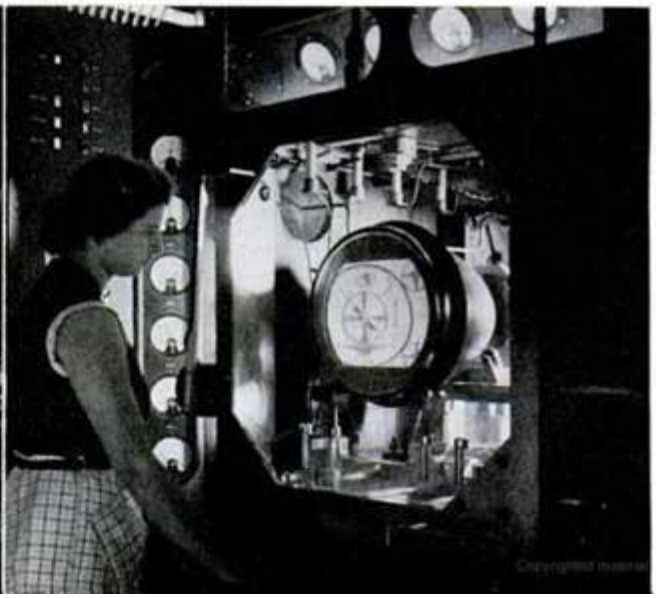


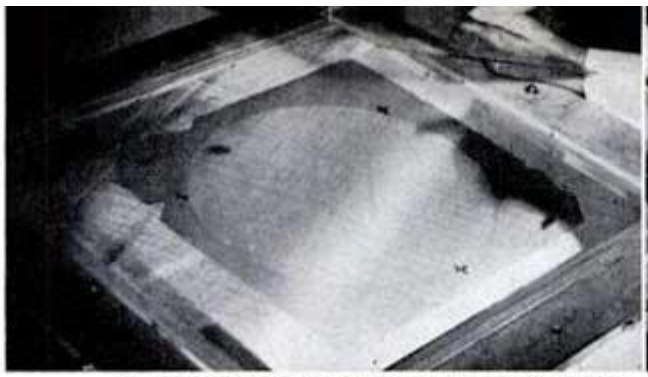
5 DRIED, PHOSPHOR-COATED tube face is put over light source for study under microscope for any flaws in servings of red, green and blue phosphors. Colors are due to addition of silver or copper activators to phosphors.

6 ASSEMBLY OPERATION is next. RCA operator holds shadow mask. Unlike one-piece black-and-white tubes, color tubes have a separate conical body and tube face. Present costly handwork will be mechanized later.

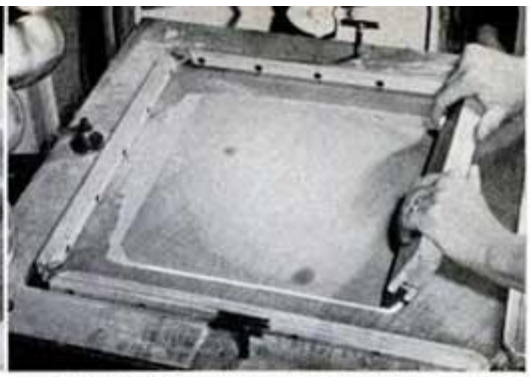
9 FLANGES on face plate and tube body are welded electrically, then examined under microscope. Electron gun has been inserted in neck. Filled with helium, tubes are tested with electronic leak detector.

10 PUMPED FREE OF AIR, tubes are sealed and tested for color fidelity and fineness of picture detail. Barium, which has an affinity for gases, has been put in necks to make vacuum near-perfect.

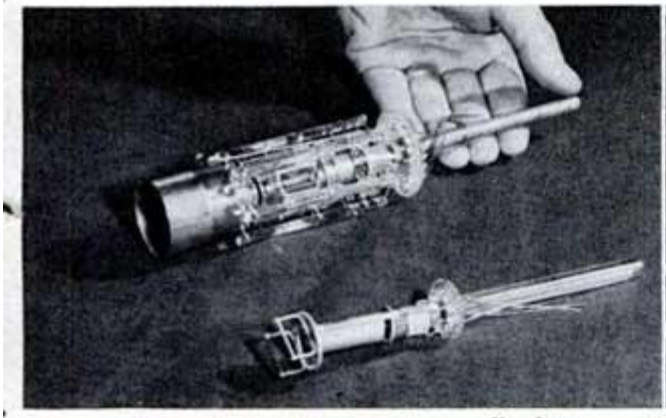




3 **REMOVED FROM PHOTO PLATE,** stencil is laid on wire supporting screen in frame. Shadow mask itself cannot be used as stencil because phosphors must be spaced for "angle shots" from electron guns. Photo process assures such spacing.



4 **GREEN PHOSPHOR PASTE** (it looks white) is poured on stencil, forced through holes with squeegee. This prints first third of series of 600,000 phosphor dots on tube face. Stencil is moved 1/1,000 inch to print red phosphors and again for blue ones.



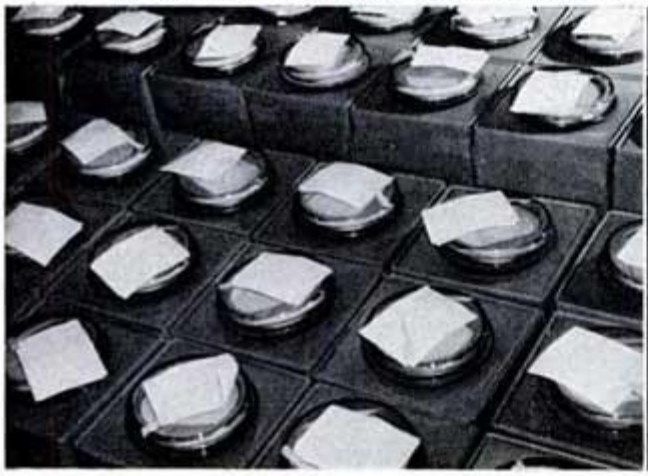
7 **ELECTRON COLOR GUN**—actually three guns in one—is bigger than that for black-and-white TV, in foreground. RCA has demonstrated experimental tubes bigger than present developmental types.

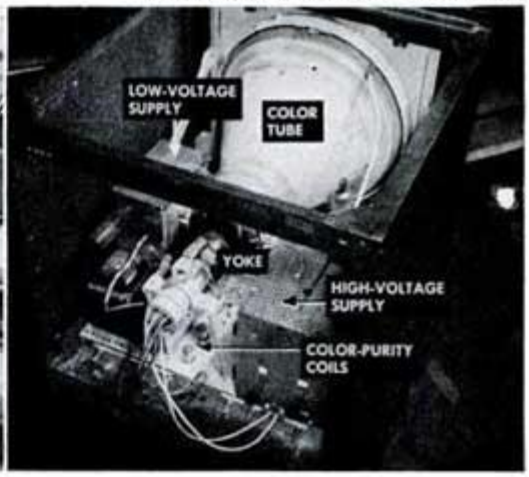
8 **PARTS GO TOGETHER** on flanged tube body. Shadow mask is first. Then come phosphored plate, a mask for outside of tube face and a glass face plate. Inside of tube body has been painted with graphite.

11 **TUBES** are readied for shipment. Each carries worksheet showing what has happened to it in manufacture. Number of "spoils"—unacceptable tubes—is being reduced as art of making them is perfected.

12 **BACK** of your color TV set will look somewhat like that of this experimental one. As for the front, it will look like a black-and-white set, until you turn it on.

Photos taken at RCA tube plant, Lancaster, Pa.





How You'll Get TV Colorcasts

[Continued from page 121]

the face of your tube. That's where your set goes to work.

What happens in the set?

Your color tube will have phosphors on its inner face. They're the same things that fluoresce to create a black-and-white picture. But the color-tube phosphors will produce the "primary" colors of red, blue and green. Mix them, and you can create any color you want.

The three phosphors carrying the individual colors are arranged in little triangular clusters. On present color tubes there are about 600,000 phosphor dots in 200,000 clusters.

In your color set will be three electron guns, one for each primary color. Your present set has only one gun. Each gun shoots its appropriate dot in the cluster. The dots light up and create color.

What makes color guns so accurate?

A baffle plate or shadow mask is interposed between the gun and the face of the tube. It's full of tiny holes. A gun can shoot its particular color because it's forced to make "angle shots" through the holes in the plate. Each color in each cluster is lined up neatly to receive a shot from only one precise direction.

But how do you get a mixed color, say a reddish-purple?

The viewing camera has three image orthicon sensing tubes, one for each color. They are excited exactly in proportion to the primary colors in the light presented to them through the camera lens. Purple is a mixture of red and blue. For reddish-purple, the red tube experiences full excitement, the blue not so much. In your receiving set, the electron guns are excited in proportion to the signals supplied by the camera tubes. So the red in the phosphors fluoresces brightly, the blue not so much. Reddish-purple results on your screen. The eye merges the small dots and sees them as mixed colors.

[Continued on page 268]

How You'll Get TV Colorcasts

[Continued from page 266]

How long do phosphors stay lighted?

Less than a tiny fraction of the time it takes you to blink.

Then the guns keep shooting them?

Yes, the whole batch, 30 times a second.

Are the phosphors shot line-by-line?

No, every other line is skipped. When the guns retrace, they shoot the lines they missed on the previous trip.

What kind of programs will color be on?

Name it yourself and you'll probably hit it. The musical extravaganza shows—NBC's Show of Shows and the Lucky Strike Hit Parade, for instance. They're talking about doing colorcasts from the Grand Canyon and Santa Catalina Island's submarine gardens. Fashion shows will be a color must. So will flower shows and those cooking-school daytime shows for the housewife where the camera focuses on yellow egg yolks, green peppers, red paprika, orange-ice desserts and golden-brown roast duck.

Will colorcasts be on film or "live"?

Live, probably. Color movie film is four times as expensive as black-and-white and costs four times as much to process.

Will there be reception interference?

Possibly, here and there. Color signals are slightly more susceptible to interference than black-and-white ones.

Is RCA Victor the only company that will make color sets?

No, most of the other companies are now licensed to make color sets.

Will all the networks carry colorcasts?

Ultimately, yes.

They were working on color TV five years ago. What's held it up?

[Continued on page 270]

How You'll Get TV Colorcasts

[Continued from page 268]

The fact is, they were working hard on color TV before World War II. The sheer magnitude of the job of perfecting it caused the delay. An argument in the industry and the FCC over compatible and incompatible systems added to it.

Will I be able to get black-and-white reception on my color set?

Yes.

When the man comes around to install my color set, what should I know about the quality of the picture?

Your color image will depend on three elements: *Brightness* is the over-all intensity of the picture. It's the only attribute of color shared also by neutral or gray tints, such as those on your present set. *Hue* is the distinction between redness, yellowness, greenness and so on. *Saturation* is what makes the eye separate strong colors from pale ones of the same hue—as red from pink.

Your serviceman will also check the definition and resolution of your color picture. *Definition* means how sharp the image is. *Resolution* means how small an object you can see clearly. END

Popular Science, November 1953