

**SPECIAL COLOR TV ISSUE**

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## COLOR TV:

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# COLOR TV!

## Today & Tomorrow

By DAVID LACHENBRUCH

### Color television's first decade—and a look at its future

THE COLOR TELEVISION BOOM, EXPECTED almost continuously since 1954, is at hand. The tenth anniversary year of the commercialization of color TV—1964—will be the first year in which sales of color sets to the public will probably exceed one million. Commercial color broadcasting was officially authorized by the FCC on Jan. 2, 1954, and the first color receivers rolled off production lines on March 17 of the same year.

Industry forecasters expect color sets to account for about 14% of TV unit sales next year, and fully 30% of television sales dollar volume. And color will be contributing a continually increasing percentage of TV servicing revenues.

The saga of RCA's unflinching persistence, and its investment of more than \$130 million in color, is a familiar one.

As a result of this almost single-handed effort, the shadow-mask tube and associated circuits represent the only commercially accepted method of obtaining a color TV picture in the home to this very day.

Where does color go from here? What of the various inventions we have heard of since 1954? Are there new tubes, new circuits and new principles in the works which promise to simplify, improve and economize home color TV? Many of the clues lie in color's 10-year commercial history.

RCA quite frankly expected color television to catch fire from its very introduction in 1954. The American public had other ideas, and the first color set—the 15-incher which gave a 12-inch picture at about \$1,000—laid an egg. People wanted a bigger picture, it was said.

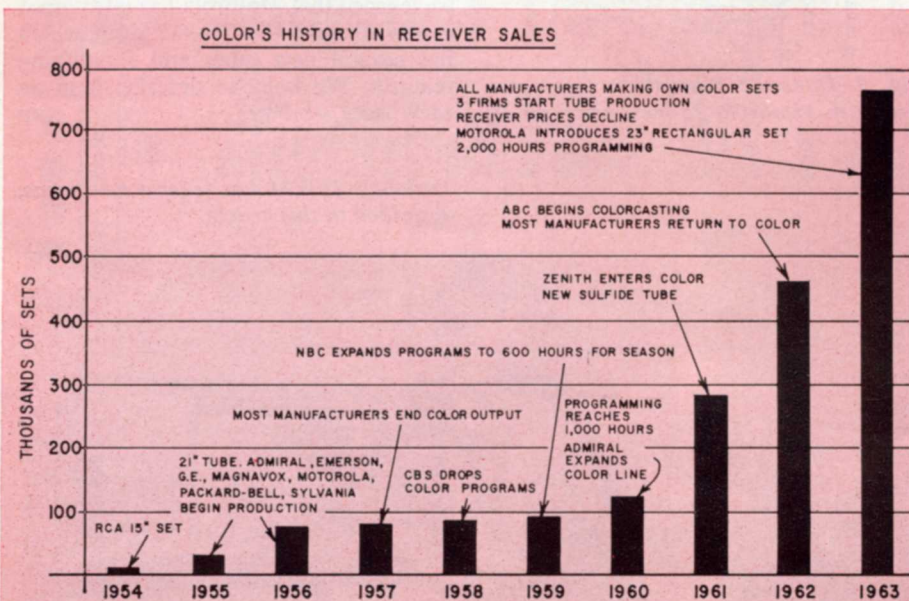
This condition was remedied the next year, when the 21-inch color set was born. It had a round tube, with 70° deflection, similar in appearance and principle to today's color tubes. Not only RCA, but Admiral, Emerson, General Electric, Magnavox, Motorola, Sylvania and others began color set production, some using RCA's 21-inch tube and others using 21- or 19-inch shadow-mask tubes produced by other makers.

Public response continued listless. Word spread that color sets were difficult to tune, almost impossible to keep in adjustment and that all you could see on them was purple people-eaters. By 1956, RCA cut list prices on its color sets to a low of \$695 and then to \$495, but color had a bad name. Most other set manufacturers—although affirming their faith that color was inevitable—ended production and liquidated their color inventory for what it would bring.

From 1956 through 1959, color sales leveled off at between 75,000 and 90,000 sets per year, as compared with 6 to 6.5 million black-and-white sets. In 1958, CBS ended all regular color broadcasts. Those were color's bleakest years. Nevertheless, NBC continually expanded its color broadcast schedule, and RCA engineers continued to engineer improvements into the color chassis and tube. These improvements were slow and gradual—there were no dramatic breakthroughs.

Color sales showed signs of more life in 1960, when they broke through the 100,000-set barrier, while network programs exceeded 1,000 hours for the first time. RCA and Packard-Bell were actually the only ones making color sets at the time, but Admiral was having some success in marketing sets built for it by RCA. The increase in programming and the improvements in color sets, together with RCA's advertising campaign, were beginning to influence the industry, particularly at the dealer level.

Color's real turning point came in



This chart shows slow start of color television, and the sudden rise in the number of sets sold during the past two years. These are author's estimates, since there are no official statistics. Each year brought with it some significant event—sometimes negative, as in color's "bleak years" 1956–1959, sometimes positive, as in the years since 1959.

1961, with the dramatic announcement that RCA's arch-rival, Zenith, was preparing a line of color sets at the request of its dealers, to give them a "full line" to compete with anything other manufacturers had to offer. The remainder of the set manufacturers quickly fell in line. Most of them, however, had once been burned by heavy losses on color, and were unprepared—or unwilling—to set up for their own production. RCA was only too willing to help them by supplying complete color chassis or kits of essential parts.

The same year, RCA introduced a new version of its 21-inch round 70° color picture tube. Sulfide phosphors—of the same type used for black-and-white—increased brightness and contrast, and reduced color smearing and trailing. Sales more than doubled in 1962. The ABC television network edged into color broadcasting, although CBS was (and still is) holding out.

But color was still highly controversial. Manufacturers began to dust off and re-evaluate old color receiver systems they had developed in the early 1950's and shelved. Among major set manufacturers, Motorola was one of the few which had not re-entered color, insisting that the bulky, round 21-inch 70° picture tube made color cabinets too ungainly for most living rooms.

While color set sales boomed, the picture-tube controversy accelerated. Working with National Video Corp., a Chicago picture-tube manufacturer, Motorola developed and demonstrated prototypes of a 23-inch rectangular 90° picture tube, about 6 inches shorter than RCA's round tube. RCA countered with the announcement that it would change over to a new shorter color tube, still a 21-inch round, but with 90° (instead of 70°) deflection. Then, as 1962 neared an end, RCA Tube Div. told its set-making customers that it would be unable to deliver the new short tube because of "technical difficulties" and reliability problems.

Color roared into 1963, and sales this year are expected to end up between 650,000 and 850,000. Among these will be some using the new 23-inch Motorola rectangular 90° tube, which is based on the same shadow-mask principles as the RCA 21-inch. The glass bulb is basically the same as that used for 23-inch black-and-white tubes, but reformed to color's more exacting tolerances.

This year saw the first reductions in the base price of color sets in 7 years. Admiral shocked the industry by introducing a table model at \$399.95, and the rest of the industry came down to \$449.95. Meanwhile, the year closes with three new manufacturers of color tubes—Sylvania, Rauland (Zenith) and National Video—in addition to RCA.



*The old Apple tube, developed by Philco around 1956. Somewhat similar principles have been used in later inventions, including the recently announced Goodman tube.*

Perhaps this year's most significant color action was RCA's decision to discontinue the manufacture of color chassis and kits for its competitors by the end of 1963. It needed the production capacity for itself. So, as 1963 ends, virtually every American TV manufacturer is building its own color sets.

Today there are probably 1.7 million color sets in use—about 70% of them sold within the last 2 years. (Since no color TV sales statistics are released, all figures in this article are unofficial estimates by the author.) Color sales are generally expected to exceed one million next year, with color sets in use passing the three-million mark early in 1965.

#### **What of the future?**

The current color TV set, despite many refinements and improvements, is basically a highly reliable and somewhat simplified version of the receiver built by RCA in 1955. What are the prospects for significant changes and completely new concepts in color receivers in the near future?

There's no question that the first important change will be in the picture tube. The 70° round tube is nearing the end of its cycle. Now being built by RCA, Rauland and Sylvania, it has perhaps another year or so to run. The industry is expected to standardize on a new color tube of the square-cornered rectangular type, with 90° deflection and measuring 25 inches diagonally. There may be an additional small color tube—a 19-inch rectangular, also with a 90° angle.

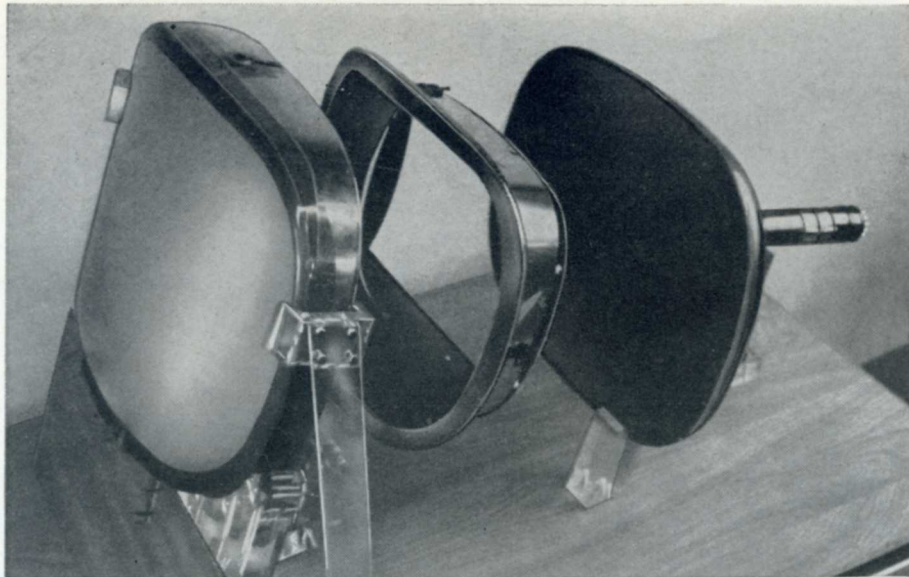
Glass bulbs for these new-size color tubes are being developed by Corning Glass Works. The new 25-inch rectangular color sets could reach the market in spring 1965—possibly as early as late 1964—completely supplanting the current round tube. (Motorola's 23-inch color sets are built to accommodate the 25-inch tube as a replacement.)

The 25-inch tube won't be new in its operating principles. It will use the same shadow-mask concept featured in all production color tubes since 1954. It will require relatively minor changes in chassis design. In fact, the new color chassis (CTC 15) introduced by RCA last summer already goes a long way toward accommodating this new 90° tube.

#### **Revolutionary developments**

Of all the other color TV tubes and receiving systems proposed in the early 1950's, the Chromatron, or Lawrence tube, has been the most durable. Paramount Pictures, which owns the rights to the tube, has periodically demonstrated to set manufacturers two versions—the single-gun Chromatron, claimed to make possible a color set at only 25% more than the cost of black-and-white, and a three-gun version, which provides more brightness than present color tubes.

No American manufacturer has recently shown an overwhelming interest in Chromatron. But Sony Corp., of Tokyo, has taken out a license with an eye to developing a portable color set using Chromatron principles. Sony off-



*Exploded model of Chromatron. Fine wire grid that deflects electrons onto correct color strip is held by center section, and cannot be seen in photo.*

cials, however, say that they are still far from knowing whether they can, or will, produce such a set.

Another development of the mid-1950's, similar in principle to the Chromatron, was General Electric's post-acceleration tube. Of course, there's no way of knowing whether this development is being revitalized in G-E's labs, but there's no evidence that it is.

Philco's beam-indexing "Apple" system created a stir in color's early days, but it's not believed that company is pursuing it now. A New York inventor, David M. Goodman, recently received a patent for a system similar to Apple in many respects. Several set manufacturers have studied his development, but that's about as far as it has gone.

A new company, Video Color Corp., has been formed on the West Coast to develop a thin color tube based on the patents of W. Ross Aiken (thin tube) and C. Willard Geer (color tube). Its major efforts for the time being, however, will be devoted to military display devices.

Color projection systems have always had some appeal because they promise to eliminate the complex three-color direct-view tube. Projection in color, however, has suffered from the same failing which prevented projection from gaining widespread use in black-and-white—poor brightness. In addition, there are color registration problems.

Two color projection systems, which claim to overcome these shortcomings, have recently attracted attention as potential home TV devices. One, invented by J. H. Owen Harries (Harries Electronics Corp., Bermuda), is a low-cost system using a special plastic distortion-correcting lens and four projection tubes, claimed to result in possibly 50% greater brightness than the direct-view system.

Another projection system, developed for theater use, may eventually have potential for the home. It's G-E's Talaria light-valve projector, whose giant-screen version sells in the \$50,000 range. Instead of cathode-ray tubes, this projector modulates a thin layer of fluid with two electron guns (one for green, the other for red and blue). A xenon light, beamed through the fluid, produces a color TV image of movie brightness. It's believed G-E is developing a smaller version of Talaria, but its cost probably will be well up in the thousands of dollars for some time, precluding use in the home.

The plain fact is that introduction of a radically new color receiving system is unlikely in the near future. The reasons are economic as well as technical. The tremendous costs of development and tooling of completely new systems would outweigh many of the advantages. Today's receiving system is far more than adequate. Any new system would have to promise markedly better performance or much lower cost to receive serious consideration. Even a system which could be proved to be slightly better or slightly cheaper would probably be rejected—and, to the best of our knowledge, nothing of this kind is in sight.

Nevertheless, you can expect many changes and improvements within the present approach to color TV reception. For the first time, color TV is competitive. "Ghost manufacturing" is past; every manufacturer makes its own sets. Finally there's a strong incentive for each to develop its own proprietary circuits and cost-reduction systems for better, more economical and more reliable receivers.

Color's decade of pioneering is coming to a close. The era of color TV in the home has begun. END