

Your Stake In The COLOR DECISION

CBS's color converter developed for early FCC color hearings.

By
MILTON S. KIVER
Pres., Television Communications Institute

The non-compatibility of the CBS system presents new problems for you, whether a set or shop owner.

WHAT may well be one of the most important decisions in the field of communications was handed down by the Federal Communications Commission on September 1, 1950. This was the long awaited FCC report on Color Television—a report that was preceded by two years of acrimonious hearings. In brief, the FCC indicates that it definitely favors the CBS system over the RCA or CTI systems. In the Commission's own words, "the CBS system produces a color picture that is most satisfactory from the point of view of texture, color fidelity, and contrast."

The decision, while not final, is the first definite word advanced by the FCC on color and may well represent the essence of the final decision.

In view of this inclination by the FCC toward the CBS color system, it is only natural to wonder how the adoption of this system will affect those who own sets now, those who service TV sets, and those who manufacture them. Each has a very substantial stake in the future of television and obviously this future lies with color television. For those readers not familiar with the details of the FCC report, reference should be made to "Spot Radio News" on page 16 where a detailed account of the report is given.

The choice of the CBS system came as a distinct surprise to many radio-men, especially in view of the fact that it is not compatible with the present black-and-white system. It will be re-

membered that much of the argument during the color hearings centered about two words: compatibility and adaptability. A color system is said to be compatible with the present black-and-white system if the color broadcast could be received and viewed on a black-and-white set without any circuit changes. Of course, the picture seen would be black-and-white, but it would contain all the detail of the color picture. The RCA and CTI systems fall within this category.

An adaptable color system is one whose programs could be viewed on black-and-white sets only after certain changes were made in the exist-

**For a complete review of the
FCC COLOR DECISION
see
SPOT RADIO NEWS, Page 16**

ing sets. The CBS system falls into this class. Because CBS' line frequency (29,160 lines-per-second) and field frequency (144 fields-per-second) differ from the line and field frequencies employed in current black-and-white receivers, CBS programs could not be received on the sets now in use without a change in circuitry.

Now, what does the adoption of the CBS system mean to you, Mr. Set Owner? Present sets coming off the production line are designed to oper-

ate at a horizontal line frequency of 15,750 cycles-per-second and a field frequency of 60 cycles-per-second. Since these values differ appreciably from those found in the CBS system, certain changes would have to be made in your set before you could view CBS color programs even in black-and-white.

Your next question, of course, is: "How much would such a change cost?" The exact answer to this question cannot be given at this time because no such conversions have been made to date. FCC engineers have devised a circuit which shows what additional components would be needed and the cost of the parts alone runs between \$10 and \$17 depending upon whether manual or automatic switching is desired. To this figure would still have to be added the cost of labor. A tentative estimate might place the complete cost of conversion somewhere in the neighborhood of \$35 to \$40.

If, in addition, you wished to receive the color programs in color, the cost would rise considerably because now a motor and a color wheel (plus associated parts) would also have to be added. Some current industry estimates place this cost as high as \$150; others say that \$100 or perhaps slightly less will do the trick.

While we are on the subject of set conversion, here is one very important point to keep in mind. As the CBS system now stands, it cannot be used with picture tubes having diameters greater than 12½ inches because the color wheel would then become too large and unsightly. That means that if your present set has a picture tube larger than 12½ inches, it cannot be converted readily to receive color programs in color!! In time, it is hoped that a color tube will be available which will permit direct-viewing of CBS color pictures without a color
(Continued on page 126)

Color Decision

(Continued from page 65)

wheel. Such tubes have indeed been developed but they are still quite crude. However, there is good reason to believe that color tubes will be perfected and when this happens then it may be possible to replace your present black-and-white tube with a color tube. But this is at least 2 to 4 years off. Bear in mind that when the time does come it will not be a simple operation to convert the set. The new color tube will require quite a number of changes and additions, circuit-wise.

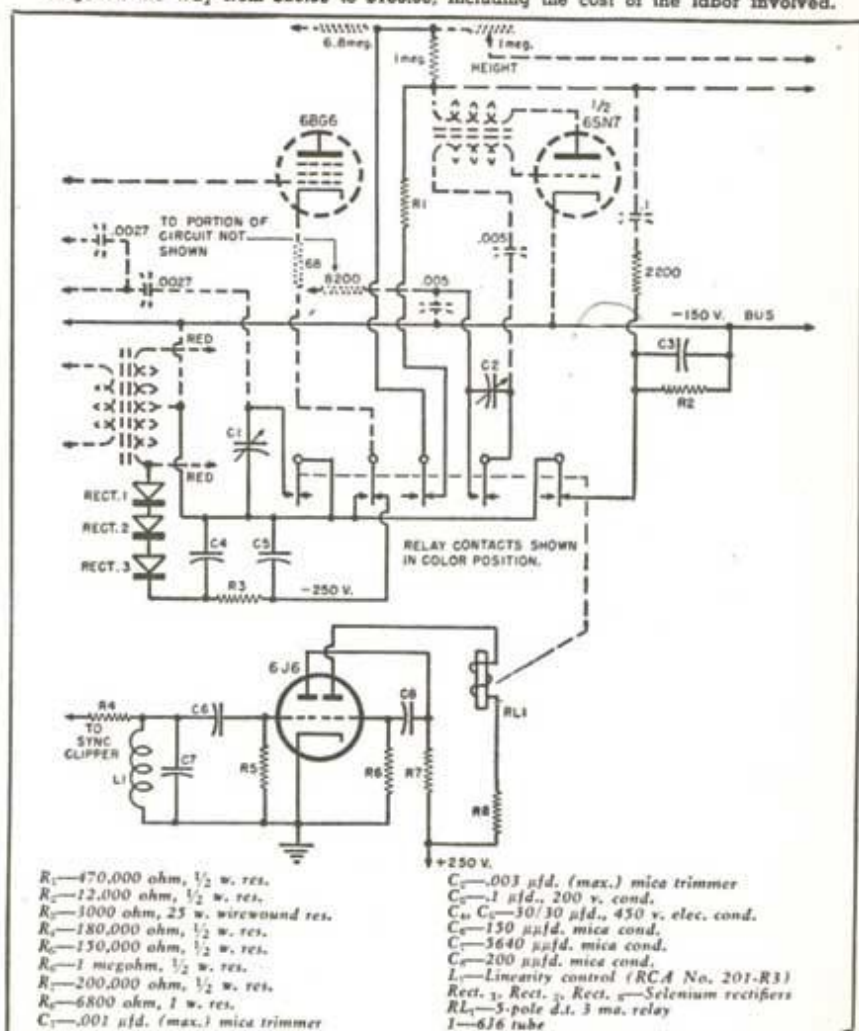
If the Commission's suggestions are adopted by television manufacturers, then after about November 12th of this year (unless the FCC extends this date to give manufacturers additional time), all new sets will contain switching circuits permitting them to operate on the present black-and-white standards as well as the CBS color standards. Note again that these

sets will not be color sets but will merely permit reception of color programs in monochrome.

So much for the consumer. Now let us look to the set manufacturers. If they agree to the Commission's proposal for the adoption of the double standards, then the Commission will not make any final decision authorizing the CBS color system as standard. Instead, it will make further investigation into the color question to determine whether any new developments or systems have been brought to light, since the hearings closed, which will provide better results than the CBS system as it is now constituted. By having the manufacturers agree to the double-standards proposal, the FCC feels that compatibility then is no longer of interest and a color system can be chosen on the basis of other, more important properties.

But suppose the receiver manufacturers do not agree to make the foregoing changes? Then, says the Commission, every passing day will find the compatibility problem aggravated

Fig. 1. Schematic diagram of an automatic scanning adapter designed specifically for the Bendix Model 235M1 TV receiver. It is possible to simplify the circuit by using a manually-operated switch in place of the automatic feature. This adapter was built by E. Chapin and W. Roberts of the FCC laboratories at an approximate cost of \$16.34. There are many other television receivers in the field today that cannot be as easily converted as this Bendix set. Estimated costs for converting black-and-white receivers range all the way from \$25.00 to \$100.00, including the cost of the labor involved.



further and the Commission will be forced to issue a final decision, immediately adopting the CBS color standards.

How do the manufacturers feel about this proposal? As far as could be ascertained at the time this article was written, the general consensus seems to be that even if the manufacturers did want to follow this proposal, it would be quite impossible to do so at this time. For one thing, there is an extensive shortage of parts and the proposed changes add more parts to existing sets. Secondly, there is no certainty that the change will be simple since no large scale changeover has been attempted as yet nor has there been any field testing. Finally, many manufacturers say that their top engineers are currently engaged in war work and could not be spared to do the basic developmental work. The Commission is aware of these conditions and there is reason to believe that they may be forced to give the television industry more time in which to work out the problems of adapting their present sets to the new standards.

We come finally to the television service technician, the man who will bear the brunt of the job of converting today's sets if and when CBS color is adopted. As noted, there have not been any attempted conversions within the industry as yet. However, FCC engineers have developed an automatic scanning adapter (as they call it) for a Bendix Model 235M1 television receiver. The circuit diagram is shown in Fig. 1. The dotted lines indicate the original receiver circuits of this set while the solid lines show how the additional components are connected into the circuit. The principal change in both the horizontal and vertical timing circuits is the addition of several resistors and/or condensers which are designed to change the frequency of the deflection voltages. A further addition in the horizontal output amplifier provides more voltage for this tube, enabling the circuit to produce a greater output. This increase in tube potentials is designed to raise the horizontal output voltage sufficiently to offset the decrease in

efficiency of the horizontal output transformer due to the change in line frequency from 15,750 cycles to 29,160 cycles.

In Fig. 1, the circuit will switch automatically when the signal changes. This is done by means of the auxiliary circuit shown at the bottom of the diagram. The circuit connects to the plate of the sync clipper stage within the receiver and thereby receives the incoming vertical and horizontal pulses. L_1 and C_1 are made resonant to 15,750 cycles. Whenever a black-and-white signal is received, the relay in the plate circuit of the second 6J6 is actuated and the contacts adjust the circuit to operate at the monochrome line and field frequencies by bringing the proper components into the circuit. On the other hand, when a color signal is being received, the 6J6 circuits receive little or no sync voltage and the relay contacts react accordingly.

FCC engineers itemized the cost of the additional components required to build this adapter and the cost came to \$16.34. Labor was not included. A reduction in cost can be achieved by eliminating the automatic feature of the adapter and making the switch-over manually controlled.

Can this adapter be made to fit all television receivers? Again a definite answer is not possible but it is believed, noting the similarity of the circuits in the majority of television receivers, that what will work in one set will work in the majority of sets. However, some manufacturers state flatly that some of their sets will require extensive alterations which will be possible only at the factory. It may very well be that some sets will not lend themselves to conversion but just which sets will be affected cannot be foretold at this time.

Of one thing the technician can be certain: His technical assistance will be essential no matter what color system is finally chosen. The wide-awake technician will keep himself fully informed of every new development reported in color television. The French call this "*savoir-faire*," the Americans call it "know-how." In both languages it means more money in your pocket.

-20-