TV COLOR activity zoomed on famed Constitution Avenue, in the electronic labs of the Commission at Laurel, Maryland, and in the labs at Princeton, New Jersey, Madison Avenue, New York City, and San Francisco, California, as the furiously-paced renewed hearing and test sessions began in the nation's capital in the early days of spring.

The second comparative-test session roared in as the curtain raiser for the three-colored event, with both the audience and performers, thrumming with first-night jitters. With a room about twenty-five by thirty feet as the theater, twenty-one receivers as the equipment, and about 125 persons looking, listening, and adjusting, the scene was quite a hectic one. There were miles of overhead cables, crowded folding chairs and swaying viewing heads to add to the confusion and audio bursts from different programs which caused many a flushed face. Reaction to the tests ran from very good to completely inconclusive. From the data that was collected, it did appear, however, as if the technical group was able to gather information that would be very helpful in evaluating the systems demonstrated.

Receivers in the room and also installed in a balcony, included ten-inch, twelve-inch, sixteen-inch and fifteen-by-twenty and eleven-by-fourteen inch projection models, all of which were operated simultaneously from antenna setups installed by the color proponents. Signals came from WNEW, operating on Channel 4, for the RCA sets; from WOIC, telecasting on Channel 9, for the CBS receivers; and from WMAL, using Channel 7, for the CTI models. Program material included wedge test patterns, moving horizontally and vertically to simulate camera movements, rotating paddles of various colors moving at varying speeds, keyboard color and black and white patterns, and fixed and live copy. In the fixed setups were cereal boxes, towels, canned good containers, while the live portions featured dancers, models, and singers attired in bright costumes.

Laboratory signals were also aired to enable the specialists to study such problems as fringing, interference, and ghost reception.

That the test period was a momentous one became strikingly obvious when the audience was surveyed. For among those in the lab room were David Sarnoff, Dr. C. B. Joliffe and D. F. Schmit of RCA; Dr. Frank Stanton and Dr. Peter C. Goldmark of CBS; Dr. Allen B. Du Mont and Dr. Thomas T. Goldsmith, Jr., of Du Mont Labs; Kenneth Norton of the Bureau of Standards; Raymond C. Cosgrove, BMA proxy, and Jack Poppele, proxy of TBA. Canada was also represented with C. W. Browne and W. A. Caton, controller of radio and chief inspector of radio, respectively, of the Department of Transport, as well as W. B. Smith, engineer in charge of the department's broadcast division and W. Hayes of the Canadian Broadcasting Company.

During informal interviews, it was learned that some of the FCC representatives were quite impressed with the demonstrations. Madame Commissioner Frieda Hennock indicated that she felt that the RCA system had displayed significant improvement over the setup shown during the first series of comparisons.

AN OFFICIAL VERSION of what the Commission, as a whole perhaps, thought of the tests appeared in quite a frank talk by FCC Headman Wayne Coy, at a conference at the University of Oklahoma. Commenting on the CBS system, for instance, Coy said:

"The system proposed by CBS has been in development longer than any of the other two systems and has progressed farther than any of the other two systems. The system has worked well and produces pleasing color pictures of good quality and good color fidelity. At the present stage of development the system must necessarily use a mechanical rotating filter as the means of producing color. Since the mechanical filter must be more than twice the size of the tube, it is obvious that direct view tubes under this system, as a practical matter, can be no larger than ten to twelve inches. . . the larger sixteen to twenty-inch tubes cannot be used with the color wheel. . . . In addition, the CBS system involves a change of transmission standards in two important respects. First, the number of
lines is reduced from 525 to 405. Secondly, the number of fields is changed from the 60 of black and white television, to 144 for color. CBS urges that the number of fields be increased, and that the overall intelligence which results from color more than compensates for the loss in geometric resolution which results. However, when a station is broadcasting color programs, in accordance with CBS standards, an ordinary black and white receiver will not be able to receive the program in black and white, unless either a manual or automatic adapter is incorporated into the black and white sets. But that is not color television.”

Then the FCC spokesman went on to describe the RCA system, which he recalled was very unsatisfactory in the early demonstrations, but displayed improvement as the recent tests revealed.

“Howewver,” he added, “at the present time, the system relies on three tubes to produce the color image. This is costly and a cumbersome procedure, and involves problems of registration. If the system works out, present black and white receivers will be able to receive color broadcasts in black and white, with no change in the receiver.”

“But,” he emphasized, “that is not color television either. . . . Getting black and white reception on present receivers from color broadcasts deals only with an economic aspect of the problem; namely, obsolescence of present-day receivers or lack of obsolescence or the cost of preventing such obsolescence as occurs when television programs, which one wants to see, are broadcast in color. . . . One additional fact about the RCA system is that at the present time a color signal will not pass through the coax presently available. The cable width used at present is about 2.7 megacycles and the RCA system requires about 4 megacycles. An RCA signal passing through the 2.7 megacycle coax emerges as a black and white signal.”

In commenting on the third system, the CTI, the Commissioner noted that during two attempts demonstrations before the Commission were not successful and that a third was in prospect.

Reviewing the advantages of the six megacycle systems, unveiled during the hearings and recent comparison tests, Coy said that. . . . “Certainly a system that would allow black and white reception on present-day receivers would be most desirable. . . . At the present time we do not have such a fully developed system. On the other hand, we do have a workable color system with good picture quality, but it is handicapped by limitations on tube size and that it cannot be received by present black and white receivers without a change.”

The answers to these puzzling problems involve many factors, Coy emphasized. He pointed out that the Commission must decide whether it’s wise to choose an undeveloped system because its color transmission can be received in black and white on existing receivers, or choose a workable system whose color transmissions cannot be received on existing receivers in black and white, or permit all of the systems to have more time for experimentation and development.

Then Coy added: “If more time were to be allowed for experimentation and development of all color systems, could the freeze be lifted and permit black and white television to go ahead? Or should the freeze be kept on until it is possible to write engineering standards for color television?”

The FCC chairman then posed several more key questions. He asked: “If there were to be time for further experimental and developmental work, is there any action, which, taken now, would protect the public presently buying television receivers in a manner which would reduce the obsolescence factor. In the event the Commission decision favored a color system fundamentally incompatible with present and white standards? . . . Given the assumptions I have just stated, could it be expected that the industry would immediately build manual or automatic adapters in all receivers? Would the relative small cost for such an addition to a set be worth it, in terms of giving the widest possible latitude for decision, after further experimentation extending perhaps a year or more? . . . Or must we write multiple standards and let the public decide in the market place which is the better system? And is there any way to assure the future use of all color sets if such a proposal is followed?”

The Commissioner then placed these questions before the audience: “Is it a proposal (the multiple-standard proposal) in which the public will willingly accept the risks and costs involved? Or must we reject all of the systems and say that we will proceed immediately with black and white television in both bands and let color wait until another generation or two, and in another, and now unexplored, portion of the spectrum?”

“These are the very difficult questions which the Commission has to face and resolve before it can decide the color television issue,” Coy declared. “And,” he added, “I am not prepared to answer these questions now.”

Commenting on queries as to the hearing’s end, in which everyone is so interested, Coy said: “I make no prediction when the hearings will end, or when a decision will be made. I wish the decision could be made tomorrow, but it won’t be.”

He said that he hoped, but would not predict, that the Commission would be able to resume the processing of applications before the year is out.

CTI, the wallflower contestant in the color race, came to life a few weeks after the official tests, with its own

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private demonstration in the Hotel Statler, before a group of newspaper men and members of Congress, including the chairman of the Senate Interstate and Foreign Commerce Committee, Senator Edwin C. Johnson. The demonstration, which featured a new approach to the problem, involving a vertical shift rather than the horizontal method used previously, was applauded by the Senator, who declared that he was well satisfied with the system now.

THE HEARINGS disclosed that many of the questions which were puzzling the Commission, particularly those raised by Coy during his Oklahoma address, might have effective answers very soon. Dr. E. W. Engstrom provided the clue that solutions were perhaps not too far away, by declaring that RCA had reached the stage where it might be possible to begin probing color standards. Such a step could now be considered, he stated, because of the high-level sampling synchronization and color phasing techniques recently developed and particularly because of the new direct-view, tri-color tube, which would be demonstrated in Washington in the very near future.

Testimony revealed that the direct-view, single tube shows . . . "an attractive picture with good resolution and good color."

Engstrom reported that . . . "Experience in black and white television has shown that in order to realize consistent performance at the limit of system capabilities, it is necessary for the terminal units—pickup tubes and picture tubes—to have resolution capabilities in excess of those of the system itself. Since this requirement seems equally applicable to a color system, our work on the tri-color tube has as a goal, the attainment of such extra resolution capability. We know of no reason why this goal cannot be attained in the near future . . . . Our investigation of receiver circuits for use in connection with a tri-color tube have, of course, been carried out in parallel with the tube development. We feel that this circuit development is straightforward and will provide for further color-receiver simplification. For example, only one yoke and deflection system are used, just as in ordinary black and white receivers. In turn, the elimination of two of the three deflection systems required in the current three picture-tube assembly also reduces power-supply needs. . . . With a suitable tri-color tube incorporated in the simplified receiver, we may produce in the not-too-distant future a fully-electronic color television receiver, with but ten to fifteen tubes more than for a comparable black and white receiver."

Questioning by Commissioners Jones and Hennock, as to the use of the tri-color tube for other systems, brought the striking reply that the tube could be used with the CBS system, even though 405 lines were involved, but that performance might not be too satisfactory because of the reduced resolution afforded by the 405-line picture.

When queried about the size of the picture that the tri-color tube would provide, Engstrom declared that a sixteen-inch envelope was being used, with the viewing area masked down to about fourteen inches. The larger envelope had been selected because it simplified construction of the elements required for three-color presentation.

Dr. Peter C. Goldmark, the field-sequential color disc exponent, indicated that he was delighted to hear of the tri-color tube, which he felt could be used in the CBS system at a much lower cost and without the addition of other receiver type tubes. He did not agree that the resolution problem was too acute. However, in an appearance before the Commission several weeks later, he described a modified system, using a sampling circuit based on the horizontal interlace principle, which provided a 525-line picture.

As soon as RCA had learned that CBS had outlined a method using sampling and horizontal interlace techniques, similar to what they had prescribed for their picture-dot interlace electronic system, headquarters issued a statement by RCA Lab Chief Dr. C. B. Jolliffe, which declared that: "At last CBS has admitted the weakness of its color television system. Because of lack of resolution in its system, CBS now states that it will now adopt the principles of sampling and horizontal interlace, developed by RCA."

Shortly after the Jolliffe statement was released, CBS issued a biting reply. Prepared by Adrian Murphy,