**COLORCASTING**, rifled with conflicting theories for over a decade, shelled quite emphatically by the D.C. ether policemen a few years ago, now appears to have found a legal haven with the warm approval of the lawmakers of the land, at least some of them. With the issuance of that second report by the Commission has come the news that the whirring shaft of the FCC goes on, and as it has been dubbed by some, will be the official medium for huecasting, news which rocked most of industry and caused many to predict that the disk will speed to an early demise.

Indications that field sequential would win, at least the first phase of the color war, appeared in many sections of the first report. The bracket-standard time table was the most significant rough spot, for the sixty-day limit was immediately conceded by many as an impossible deadline date. The mechanical switch requirement was another stumbling block, practically all in industry stating that they didn't even know how to calculate the 405-525 line provision in an effective way in so short a time. In addition, there were the statements declaring that unless the proponents could produce equipment that would unqualifiedly meet the Commission's criteria, all bets were off and CBS would be declared the winner for the time being. After reviewing the criticism heaped on the other two systems, citing that neither method appeared to be capable of rapidly overcoming their innate defects, the consensus was that in the short time allotted little could be done to alter the legislators' opinions.

The second report reaccented the majority views of the airwave judiciary. For instance, there appeared the statement that in the opinion of the Commission ... "the CBS system squarely meets the test of adaptability and convertibility... It is the CTI and the RCA systems that fail to meet the test, for neither CTI nor RCA demonstrated a practical converter and hence failed to meet the test of convertibility." Describing the basis under which the new standards were being adopted, the Commission said that the new rules being promulgated were for "...expert calculations based on the characteristics of the present standards and the evidence concerning the CBS field-sequential color system. It is clearly within the province of the rule-making proceedings, as prescribed by the Administrative Procedure Act, to adopt such standards without the necessity for further public hearings...."

As in the first report, contrary remarks appeared throughout many paragraphs which attempted to explain the Commission's reasoning behind the conclusions reached. For instance, in a review of the problem of horizontal interlace, it was pointed out that in the record shows quite clearly that if this technique is successfully developed for the CBS system, and it can be added at a later date, horizontal resolution would be increased and provide an appropriate picture improvement. However, the Commissioners, if it had been possible to adopt bracket standards now (which it couldn't because of the reluctance of industry to go along) the Commission could ... "determine whether to increase vertical resolution as well as horizontal resolution."

Since receivers without brackets could not be adjusted to a different line rate, our inability to adopt brackets at this time probably means that as a practical matter, when and if horizontal interlace is adopted for the color system, the improvement may be confined to horizontal resolution. Thus any suggestions for improvement of vertical resolution may be bypassed.

The problem of long-persistence phosphors, cited as means of providing better and brighter pictures with no objectionable flicker, may have to be overlooked now, too, because of the immediate adoption of the CBS setup. In the words of the FCC: "Had it been possible to develop the field of long-persistence phosphors turned out to be sufficiently impressive, the Commission could consider lowering the field rate and increasing the resolution without objectionable flicker."

Ripping into those who were requesting new hearings because of improvements in color systems, the second report declared that in the Commission's opinion ... "a new television system is not entitled to a new hearing or reopening simply on the basis of a paper presentation." Citing that in the radio field many theoretical systems exist, and that it's a long step from a description to a successful operation, the Federal experts added: "There can be no assurance that a system is going to work until the apparatus has been built and tested."

The denial of an appeal for a test by RCA a few days before the second report was issued, pressured the stern beliefs the Commission had on reopenings. In denying this petition, the ether guardians rebuked the dot-sequential proponent, declaring that the "...state of television is such that new ideas and new inventions are matters of weekly, even daily occurrence... the question of approving a color television system which will best serve the interests of the American people is one which has been before the Commission for almost ten years... in all proceedings such as the instant one a point is reached which calls for administrative finality... and in the sound discretion of the Commission a delay in reaching a determination with respect to the adoption of standards for a color television service... would not be conducive to a speedy and expedient dispatch of the Commission's business and would not best serve the ends of justice."

Notwithstanding the Commission's sharp rejoinder, RCA announced that they would not only continue but their color research, but would hold a series of demonstrations in Washington, during which the latest improvements in compatible all-electronic high-definition color would be shown. In a telegram to all licensees, RCA said: "At this demonstration we will supply you with information about our latest simplified circuits, the converter and the tri-color tube. We shall continue to give you further demonstrations periodically so that you may see the successive steps in our progress... By June 30, 1951, we will show that the laboratory apparatus which heretofore has been developed has been brought to fruition in a commercial, fully-compatible all-electronic system... available for immediate adoption of final standards."

Blunt addresses by FCC headman Wayne Coy before advertising and engineering groups, days before the CBS edict was issued, also served as a forecast of how the color wind blew in Washington. Discussing the demonstrations, Coy said that during all of the tests the dot and line-sequential proponents had ... "trained operators who worked assiduously before each demonstration to see that the equipment was adjusted in tip-top shape and who hovered over the equipment... continuously making adjustments to insure optimum performance... Despite all of these efforts... the proponents were unable to maintain accurate registration and color control... You can imagine what the situation would be like in the ordinary home where children or untrained adults had to operate such receivers."

The conclusion seems to be inescapable that CTI and RCA (Continued on page 109)
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devoted so much of their efforts to the
compatibility part of their systems
that they never succeeded in produc-
ing satisfaction.
As cited previously all of the Com-
mis sioners did not agree that the
mechanical system should be the
chosen one. And when the second re-
port was released, continued evidence
of reality, ranks appeared with seething dissenting opinions from
the pens of Commissioners George
Sterling and Frieda Henneck. Declared
Madame Commissioner: "In the light
of the progress made in the develop-
ment since the start of the proceeding,
I think it essential to defer the final
decision in this matter until June 30,
1951. . . . It is of vital importance to the
future that we make every effort to gain the time necessary for
further experimentation leading to
the perfection of a compatible color
television system. . . . It is important
to repeat the conviction, expressed in
my statement of the first report, that
there is a moral obligation on this
Commission to insure that a reason-
able amount of valuable programming
service will continue to be rendered
to present set owners, both day and night,
for a transitional period; e.g., three or
five years, without the necessity for
making any expenditure to change
their sets.
Sterling also quite critical of his
fellows Commissioners, pointed out that
a cooling-off period of at least two
days should have been provided after
the bracket deadline, so the industry
could have thrashed out its differences
and perhaps come up with a series of
helpful answers. The shortsighted ac-
cion, closing the door on future develop-
ments, will in his opinion, seriously
impede color progress. He felt, also,
that the decision now to insist on chas-
sis changes, when industry is becoming
more and more involved in emergency
activities and shortages are beginning
to mount, was a faulty one which
could raise havoc. He particularly
struck out at the views that the public
would accept smaller screens, when the
trend was toward larger and larger
tube sizes. Such thinking, he implied, was inconsistent with the
bigger tube programs, regardless of the
attractiveness of colored repro-
duction.
In Sterling’s report there were
references to the bags of mail from
industry, the bulk of which carried
angry denunciations of the wheel rul-
ing. In a letter from one manufac-
turer, the FCC was told that the pro-
grahm of development "will cause
irreparable injury to broadcasters,
manufacturers, and present set
owners." Another set maker said that the
increased list price, required by the
addition of color and other com-
ponents, is "a severe penalty for the
public to pay . . . for a feature
which may never be used." From an-
other chassis producer came the com-
ments that it could not conform with
the conversion request since, first, no
CBS color signals are available for
engineering tests, and second, certain
technical difficulties were encoun-
tered in obtaining pictures of
geometric linearity and brightness on
higher frequencies, as well as reduced
scanning efficiency due to the return
time of the horizontal sweep. In the
opinion of the set making set
makers in the country, not over 5 per-
cent of the ten-million sets which will
be in service before the year is out,
will ever be made compatible with the
Columbia system. Still another
large video receiver producer declared
that they regarded the decision sci-
c片ically unsound and against the pub-
lic interest. "No incompatible system
is good enough for the American pub-
lie," said this manufacturer, who added
that the estimated cost of the $35-
dollars that present set owners would
have to spend and that future set
owners would have to pay to obtain
"a degraded picture with an in-
compatible system reduces . . .
the order to an absurdity.
One manufacturer, who said that he
would make available adapters and
converters for the disk system, de-
cleared that apparently their intentions
were misinterpreted and hastened to
release a statement which he said, in:
"We are neither in agreement
with nor do we condone the ill-con-
sidered decision of the FCC . . . .
The decision, however, has been made. It
probably will not, and we hope that it
does not, remain . . . . It is our earnest
hope that the present non-compatible
system . . . will be replaced by a com-
patible system before it is necessary to
market these devices."
Prior to the decisions there were
rumors which made it possible to think
would be filed, should the Commission adopt the
wheel scanner. Two such suits ap-
peared on the judicial calendar within
a week after the second report ap-
ppeared, one from a proponent and an-
other from a set maker in New York
City. Both complaints, filed in the
U. S. District Court in Chicago, de-
cleared in part that industry, broad-
caster, and set owner stands to be
seriously affected by the field-sequen-
tial order. One complaint charged the
order was contrary to public interest,
was arbitrary and capricious, exceeded
the authority of the Commission, and
was not supported by the evidence.
Continuing, this suit which attempted
to restrain the Commission from
enforcing its order, stated that . . . "Al-
though the Commission has no juris-
diction over television manufacturers,
the Commission sought to require that
such manufacturer agree with the
Commission to build only their black and
white receivers according to the
specifications laid down by the Com-
mis sion. These specifications required
extensive alterations in present pro-
duction model receivers. The Commis-
sion stated to the television set manu-
facturers that if they did not agree so
to build their sets the Commission
would forthwith and finally adopt the
CBS color system."
Within twenty-four hours after the
suits were filed, FCC issued a blunt
statement which declared that they
would vigorously oppose the issuance
of any permanent restraining or
injunctive relief. In response to a portion of the complaint
which inferred that the Commission
had been unduly influenced in its de-
cision by an employee of the Commis-
sion who had patented a device use-
able in connection with the CBS system,
the government specialists pointed out
that their position in this matter was
clearly detailed in the record.
During the hearings Harry Plotkin,
FCC counsel, told those in the session
room that Ed Chapin had constructed
in the lab a receiver which featured
automatic adaptation from one set of
scanning records to another, and that
such set would be demonstrated in a
room nearby. As soon as the circuit
of the change and a description of it
were received in evidence, and tagged
with a legal exhibit identity, counsel
for the set-sequential proponent rose
to say that he understood that . . .
"this development of Mr. Chapin's
constitutes what might be considered
an improvement in the particular sys-
tem being proposed by CBS in these
proceedings." He then added that in
this case the Commission might be con-
sidered as serving in a judicial capac-
ity . . . "because it may have to choose
between contesting proponents here,
and then the Commission moves for-
ward with a development which seems
to be an improvement in the system
proposed by one of the litigants, it
sounds a little bit like a person in a
judicial capacity assisting one of the
parties in the contest. . . . I just want
to make that statement and say that
we take exception to putting this
development into these proceedings,
because we think it is serving the pur-
purposes of the public interest;
with the judicial position which the
Commission should take in the pro-
ceedings."
Chairman Cox took one steely look
at the attorney and said that Mr.
Chapin is the head of the lab and not
a member of the Commission, and in
no way . . . "in position to determine
the vote of a single member of the
Commission; nor is any other member
doing from the staff of the Commission." De-
claring that the members are perfectly
competent, the chairman added that
they have . . . "the ability to deter-
mine between contesting forces." And
then he remarked that he suspected . . .
the suggestion very much that the
Commission is influenced in its
determination by the work of a single
member of its staff or all of its staff
when it comes to making a decision on
this record." Then Cox concluded this
portion of his reply with the state-
ment: "If there is anything else to be
said on this, let's get it off our
chest now." The attorney for the
contestant arose again and repeated
that he still thought the procedure

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a little bit out of order, a comment that riled Coy and prompted him to say that the Commission had asked for equipment from others so that they might have an opportunity to work on it. "I suspect," said Coy, "that some of our people have capabilities of effecting some improvement in that system and that we may, when and if we get hold of that equipment, file a patent on an improvement on that equipment for the benefit of the Government of the United States." Coy then pointed out to the attorney that . . . "you will recall privately that I have had something to say to you about equipment and have had some argument with you whether it is proper for us to have the equipment. We have not yet received the equipment. When we receive the equipment, we will have the same opportunity to work on the equipment as we do on CBS equipment." This brought forth a reply that . . . "We will welcome that, and as soon as we can get the equipment to you, we will."

In a parting blast, before the group left to look at the disputed receiver, Coy said: "Is there anybody else who has questions. I am perfectly willing to answer questions on this as chairman of the Commission, and I do not feel any one of us considers it improper for us to have taken such action, and want to add further. If you do not know it, that I have already signed the letters to patent the equipment that you are going to see."

In an attempt to clarify the operation of its system, CBS reviewed the basic features for the press. In their method, colors are changed after each vertical scanning period or field. There are 144 fields per second, and as in black and white, two-to-one interlacing is employed. The number of lines per frame is 405, or 205.5 per field (262.5 in black and white). Thus, the total number of lines per second, or horizontal line frequency, is 72 times 405 or 29,160, which is slightly less than twice the black and white horizontal line frequency, which is 30 times 525 or 15,750.

The colors are transmitted in the following sequence: red, blue and green. Each color lasts for 1/144th of a second, and the color sequence repeats itself after 1/48th of a second. This period is called a colorframe interval. Since only one-half the number lines will have been scanned in all colors in 1/48th of a second, twice this period, or 1/24th of a second is required for all lines to be scanned in all colors. This period of 1/24th of a second is called a color-picture interval.

The color disk rotates in front of the receiver tube at a rate of 1440 r.p.m. When six color filters are employed, two sets of red, blue and green filters are used. The over-all diameter of the color disk is determined by the size of the picture tube used. It will be slightly more than twice the diameter of the tube.

At the transmitter, a color filter disk, fully enclosed, rotates in front of the pickup tube and contains a series of color filters. If the camera disk has twelve filters or four red, four blue and four green, the disk rotates at 720 r.p.m. Every 1/144th of a second the camera scans electronically the image to be transmitted from top to bottom, while one of the colors in the filter disk, permits, let us say, only the red components of the scene to be picked up. The next 1/144th of a second, the blue filter is between the lens and the camera tube, and only blue components of the scene are scanned. The same sequence occurs to the green components. The vertical scanning rate of 1/144th of a second is synchronized with the disk rotation, and in addition, an extra impulse is inserted in the transmitted signal every third field, or every 1/48th of a second. This impulse permits the receiver disk to be phased automatically, if so desired.

As this column was being readied for the mailbag, about a half-dozen manufacturers had indicated that they would make adapters, converters, and switch models. A few others declared that they might follow along, but most indicated that they would not be able to produce CBS pickup chassis for quite awhile, with many saying that they just wouldn't make such sets at all. The year '51 should provide an intriguing answer to this tantalizing situation. . . . . . . . . L.W.