any one institution to undertake the job of trying to handle it alone.

Besides collecting films originally made for scientific and research purposes, samples of film produced daily for television should be collected. News footage should be collected in specialized institutions.

Motion-picture collections which rest in the hands of private individuals should not be permitted to pass into oblivion.

There should be created a national, union list of institutions where films exist; and such a list, delineating these holdings, should be regularly published.

And finally, but of pressing importance, a union catalog of films in archives should be started.

On the international front, there are similar needs to be met, and our own resources can be immeasurably augmented through systematic interchange of information with our colleagues overseas.

Letters to the Editor

Re: 8mm and Small-Format Film

Dear Sir:

I have noted with great interest the articles on 8mm film and its use for sound reproduction.

It is clear that you have finally realized that the existing format for 8mm film was completely illogical. The proposed changes published in your *Journal* [August, 1962] are in fact a repetition of the principles I outlined eleven years ago in the magazine *Cine Amateur*, No. 142, April, 1951, . . . on the first page [of which it may be noted] that I had decided upon the adoption of a logical format of 10-mm width with square perforations 1.3 × 1.3 mm in size. The picture area was thus more than double that of conventional 8mm film, but no provision was made for the addition of a soundtrack. Such a track can be easily accommodated by using the same pitch (4.75 mm) as for 35mm perforations.

I have no illusions about the difficulty of changing established standards, and I assume that probably the only change made to the conventional 8mm format will be the adoption of the square perforations measuring 1.27 × 1.27 mm, as proposed by our colleague, the expert J. A. Maurer.

December 19, 1962

Jean Vivié
Commission Supérieure Technique du Cinéma
92 Champs Elysées
Paris 8, France

Dear Sir:

I am in agreement with Don Norwood, in the February issue of the *Journal*, concerning the inability of many members to be present at conventions, and the desirability of being able to make comment on various subjects presented in the form of convention papers.

In this case, I am impelled to comment on the two papers in the February *Journal*, concerning narrow-film formats for educational and nontheatrical use.

My comments are in connection with two aspects.

First, the question of film size. It has long since been obvious that any savings from a new format will come from conveniences in processing and handling, plus the possibility of a broadened use and larger demand. Mere reduction in film size does not, in itself, materially lower the cost of prints, as has been amply demonstrated.

Most proposals, therefore, call for some method by which more than one print can be made at a single pass through the printer and developing machine; this is the case in 8mm contact printing, but not optical printing, since the two rows of images run in opposite directions. 16/32 does have the ability of producing two prints at one pass, by means of well known optical techniques, and 32/35 is mainly a means of adapting that method to existing 35mm developing machines.

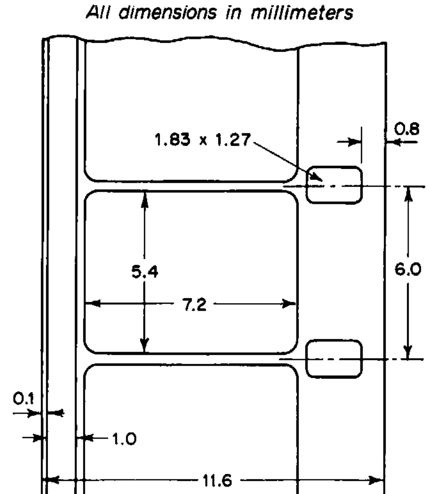
I am surprised, therefore, that no one has so far proposed a standard which would be, essentially, 1/3 of 35mm, or 11.6 mm. The same optical techniques would produce 3 prints at a pass rather than two, and thus increase economy rather markedly. Using a perforation of the same shape and size as the current 8mm film, the 11.6, mm format would allow a soundtrack width of 1.0 mm (approximately .040 in.); with a perforation pitch approximating 6.0 mm, the running speed would be 30 ft/min at 24 frames/sec and the image area would be almost twice as large as that of the current 8mm film.

If one were to consider this film as being 35mm film reduced in all dimensions by exactly 1/3, it is evident that reduction printing of the picture could be done on a *continuous* optical printer — the rather wide frame line of the 35mm negative is actually 3 mm wide, and would reduce to 1 mm in the print. Since the image size contemplated on the 11.6-mm film now shows a frame line of 0.6 mm, the increased width would be only 0.4 mm or a reduction of frame height from 5.4 mm to 5.0 mm — not a serious loss of image.

There is no insurmountable problem in building a continuous optical picture printer which could run at 180 ft/min at the 35mm end; if this contained beam splitting devices to produce all three rows of images at one pass, we would have a production of three one-reel prints every $5\frac{1}{2}$ min or less than 2 min per individual print. Soundtracks, of course, could be contact printed from a three-row negative on an attachment to the same machine, and if magnetic is preferred, a three-head transfer-recorder can produce the same results with no obvious technical difficulty.

With minor changes in frame dimensions, prints in this format could as easily be made by reduction from a 16mm original, if desired, again by continuous reduction.

My second question is also one which is mentioned in both

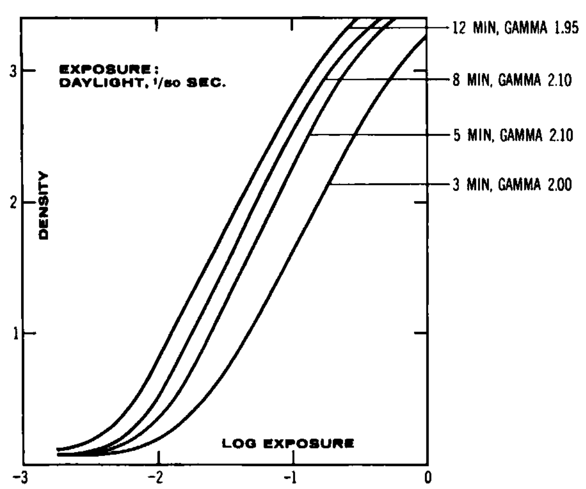


150 feet of KODAK LINAGRAPH SHELLBURST Film (ESTAR Base)

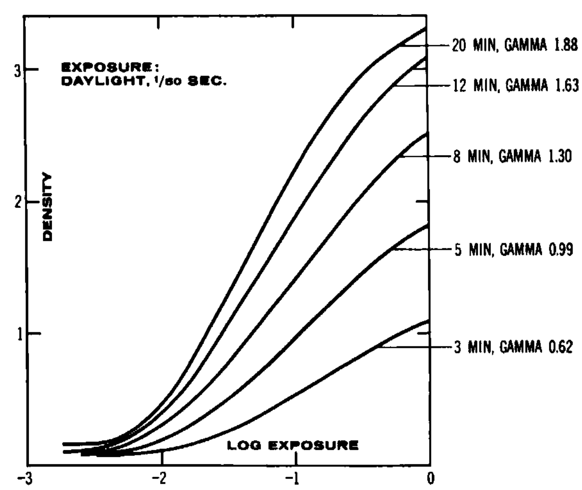
(actual size)

This one is best known for high acutance in photographing a tiny target in a great big bright sky. Through haze. It is also the one for extreme dimensional stability and top strength despite cold and dryness.

Don't get the idea that contrast in this film cannot be anything but high. That idea stems from the following behavior in KODAK Developer D-19 at 68°F:



Observe, however, the contrast control that KODAK Developer D-76 at 68°F affords:



Fuller details from . . .

EASTMAN KODAK COMPANY, *Photorecording Methods Division,* Rochester 4, N. Y.

papers, and that concerns the desirability of wider aspect ratios than the standard 1.33:1. Whatever advantage may accrue to such "wide-screen" processes in theatrical use, there is considerable doubt in my mind as to their utility in educational, industrial and home use.

For one thing, the illumination in the average incandescent-lamp projector is rather inexorably fixed by optical considerations, and if we consider that an 8mm projector can produce optimum brightness on a screen 45 × 60 in. in size, then for a 1:2 aspect ratio, the screen image would be 37 × 74 in. Thus, in effect, we have not enlarged our image size usefully — we have merely reduced its height and increased its width. For many close-up subjects, particularly those used in educational film, this added width is merely wasted space — close-ups often end up *smaller* than on a standard screen.

Psychologically, in an average room, the surroundings give scale to the picture, and by no stretch of the imagination can a screen 37 × 74 inches be considered a "giant, wide screen." The audience will persist — I have this feeling myself, all the time — in feeling that the image has not been widened, but merely reduced in height.

In Neyman and White's paper, a format of 1:1.5 is suggested, and the reason given, among others, is the popularity of the 24 × 36-mm format in amateur and professional slide projection. This, it seems to me, is based on several misconceptions.

First of all, the 24 × 36-mm format was no more than an arbitrary decision, usually attributed to Oskar Barnack in the design of the Leica camera. It came about merely by doubling the standard 18 × 24 Edison format, and had no other reason for existence.

Secondly, one cannot make a direct comparison between formats for still pictures and those for the motion picture. The most important difference is that the still camera can be turned either way up in use, so as to make most economical use of the image area. This is corroborated by the fact that all screens supplied for projection of 2 × 2 slides are *square* in format.

Actually, the trend in still photography is toward square images, not toward the so-called "panorama." Almost all twin-lens reflexes produce square images, either 4 × 4 or 6 × 6 cm in size, and the reason is simply that the camera cannot be turned on its side. A more convincing example, perhaps, is the design of the Omega camera, which uses #120 roll film, but was designed for a format of $2\frac{1}{4} \times 2\frac{3}{4}$ inches, rather than the normal $2\frac{1}{4} \times 3\frac{1}{4}$ generally made on that film size.

Going back somewhat in time, I have a large collection of $3\frac{1}{4} \times 4$ inch slides, used for educational purposes, and more than 80% of these are framed in mats $2\frac{3}{4} \times 3$ inches — an aspect of ratio of only 1:1.1.

And finally, let us never forget the possible use of these smaller prints for inexpensive circulation of programs to television stations, where the 1:1.33 ratio will apparently be with us for a long time.

Yet another reason for the maintenance of the 1:1.33 aspect ratio is the fact that the production of educational film, especially in the historical field, involves the use of a good deal of stock footage, almost all of which is in the 1:1.33 ratio.

For all these reasons, I think it imperative that any new standard retain the 1:1.33 aspect ratio which has been in use for more than 75 years. This does not, of course, rule out the ability to make a direct reduction from a CinemaScope negative, and then to project it with the usual anamorphic lens, if desirable. But it would be a mistake, I feel, to establish a standard based on one of the makeshift wide-screen formats currently in use, and later find we cannot accommodate all the other, important uses which continue to prefer the 1:1.33 format.

I commend the above to the attention of the appropriate committees.

April 1, 1963

John S. Carroll
4526 Sheridan Ave.
Miami Beach 40, Fla.

Re: The Exposure-Control Myth

Dear Sir:

It was impossible to read the recent letter from Don Norwood, "An Exposure-Control Myth," without taking extreme exception to it. The letter presented an argument which intended to prove that the overall brightness method of determining camera exposures is improper. The tone of the letter is such as to suggest that this method (used in all 8mm electric eye cameras at this time) should be discarded, and that a method based on the measurement of incident illumination be substituted for it.

Several highly pertinent facts are omitted from the argument. When these facts are also considered, the conclusions drawn by Mr. Norwood can be seen to be in error.

A large segment of the photographic industry serves a class of people who should be called "picture-takers" rather than amateur photographers. These are the people who want a record of the happy times in their personal lives in spite of the fact that they are not at all interested in the photographic process. Their only goal is to obtain a colorful and pleasing visual record which can be re-created at will on their home movie screens. The problem in serving these people is in making the whole process as simple and painless as possible, meanwhile providing a generally acceptable end result. It is important to remember that there is no requirement for photographic perfection, and that there is an overwhelming demand for the camera to make the decisions.

However, let us leave this point for a minute, and cover those areas in which agreement with the contents of this letter is possible. First, there can be little argument with the photographic examples which were described. These scenes, in which highly reflective objects are placed against a dark background, certainly can occur even though they do not occur with great frequency. Second, an incident-light method would result in a more pleasing exposure provided that the ladies, rather than the cloth drape, were the actual subjects of interest to the photographer. Third, I expect that an expert cinemaphotographer will choose an incident-light method in preference to an overall brightness method in any scene where either can be applied, and where the choice between the two must be made. Unfortunately, these are the sole areas of agreement.

Exposure determinations made by incident-light measurements are actually subject to considerable error when placed in the hands of a nontechnical picture-taker. This is because of the fact that the photographer must have access to his subject in order to use the incident-light method. This is fine on a motion-picture set, where the photographer can and does cause the incident-light sensor to be placed at the position of the subject. It is a stringent limitation on the freedom of a "picture-taker," and a limitation he will refuse to accept. Let us look at this a little closer by means of a few examples.

The first example is the typical scene shot through the windshield of a moving auto. Who will dash up front to take a reading? Another is a picture of distant scenery. Who will carry the sensor up the mountain? A third is a vertical shot of the Empire State building. Who will lean out the window to measure how much light is falling on the outside wall? Of course, these are unfair comments; and, of course, any reasonably intelligent person can be taught the short cuts and approximations needed to make such antics unnecessarv. But what

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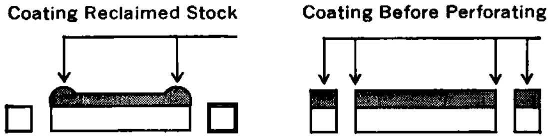

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Magnetic Products Division 3M COMPANY photo dealer will do all of this teaching to sell a $70.00 camera? As a practical matter, our picture-taker cannot accept the limitations of an incident-light meter at the subject.

There is another method of using the incident-light technique, a method which I believe was proposed some years ago by Mr. Norwood. The incident-light sensor is placed on the top of the camera, and the assumption made that the incident illumination at the camera is the same as that at the subject. Let us imagine our picture-taker wandering through a few more scenes.

Our picture-taker, with his camera-mounted incident-light sensor, now stands outside his home and proceeds to photograph his family waving to him from inside their picture window. A little while later, he photographs his children playing in the sunlight, but now he is the one inside the picture window. In the evening he attaches his camera to a light bar and makes some indoor movies. These examples should illustrate the fact that the assumption of equal incident light on the camera and subject is a poor one, and that errors of several *f*/stops can be expected. An overall scene brightness determination would have produced more pleasing exposures in every instance.

Just such experiences were sufficient, when electric eye movie cameras were first being developed, to completely banish incident-light methods from further consideration. (This excepts one auxiliary use in which a second small photoc ll recognizes and compensates for a backlighted scene in an electric eye camera.) It would be very interesting to examine the mathematical analysis Mr. Norwood might propose to deal with an incident-light system operating on the above scene examples.

The foregoing should illustrate that a picture-taker causes an entirely different exposure problem from that of the skilled professional who combines artistic sense with technical know-how to produce a predetermined result on the motion-picture screen. Mr. Norwood's argument may be completely valid for the professional. An entirely different solution is required by the picture-taker.

The most effective treatment of the problem has been that employed by Eastman Kodak. My understanding of their work is that the best exposures for a large number of typical amateur scenes were determined, and were then compared with the exposures indicated by their measured overall brightnesses. The conclusions of this investigation* were stated as follows:

(1) 68% of the best exposures for all scenes will be within one-half stop of the calculated exposure for each scene; and

(2) 95% of the best exposures for all scenes will be within one stop of the calculated exposure for each scene.

Obviously, such conclusions do not claim perfection for the overall brightness method, but they certainly indicate that the "generally acceptable end result" desired by the picture taking public is being achieved.

These statements, which were made several years ago, also indicated the most promising area in which to make improvements — in increasing the latitude of the film so that the expected differences between the best and calculated exposures cause smaller picture degradations. Kodachrome II appears to have been such an improvement.

Summarizing this briefly, incident-light exposure determinations at the subject position are a practical impossibility for many amateur scenes, even if the picture-taker could be persuaded to travel the round trip between camera and subject before exposing each new scene. If, to overcome this objection, the incident-light determination is made at the camera position, differences in incident-light on the camera and on the subject will cause intolerable exposure errors. In contrast to this, the overall brightness method results in most exposures being within one-half stop of the best exposure, and almost all exposures being with in one stop of the best exposure. Recent increases in film latitude have made these small (for the picture-taker, not the professional) differences in exposure even more tolerable. Finally, there is a sound mathematical basis, even though statistical in nature, on which to base the use of the overall brightness method of determining exposure. The fact that this basis is founded on experimental data should not make it objectionable. After all, the proof of the pudding is in the eating.

March 27, 1963

Mervin W. LaRue, Jr.
Engineer and Consultant
22 Indian Trail Rd.
Barrington, Ill.

*Allen Stimson, "Measuring and judging photographic exposure of color film for automatic exposure controlled cameras," *Photo. Sci. & Eng.*, *4:* 203–207, Aug. 1960.

Dear Sir:

Mr. Don Norwood's letter, "An Exposure-Control Myth," published in the February, 1963, *Journal*, quite well reiterates his ideas regarding the relationship of incident light to camera exposure control.

It should be remembered, however, that measurement of the incident light is only one of several steps which must be considered to achieve optimum results. The measurement of illumination, lighting contrast, brightness, and in color, the color temperature, are all as basic as the measurement of incident light itself.

For instance, in black-and-white TV filming the criterion is brightness level and the least important is the measurement of the incident light.

At any rate, the knowledge of the physics of visual reproduction progresses so rapidly that constant photometric research is vital to any discussion. Conceptions valid in the 1940's and 1950's may not encompass all of today's knowledge.

Emulsion now has such a wide range that the electric-eye-on-the-camera shotgun type of approach to determining exposure satisfies the amateur who seeks the automated general purpose camera.

But, complete exposure control is important to the "bread and butter" professional who must set his camera by taking into consideration the illumination, the scene brightness, the lighting contrasts and the color temperature.

April 9, 1963

Karl Freund
Photo Research Corp.
837 Cahuenga Blvd.
Hollywood 38, Calif.

(*Continued on page 418*)

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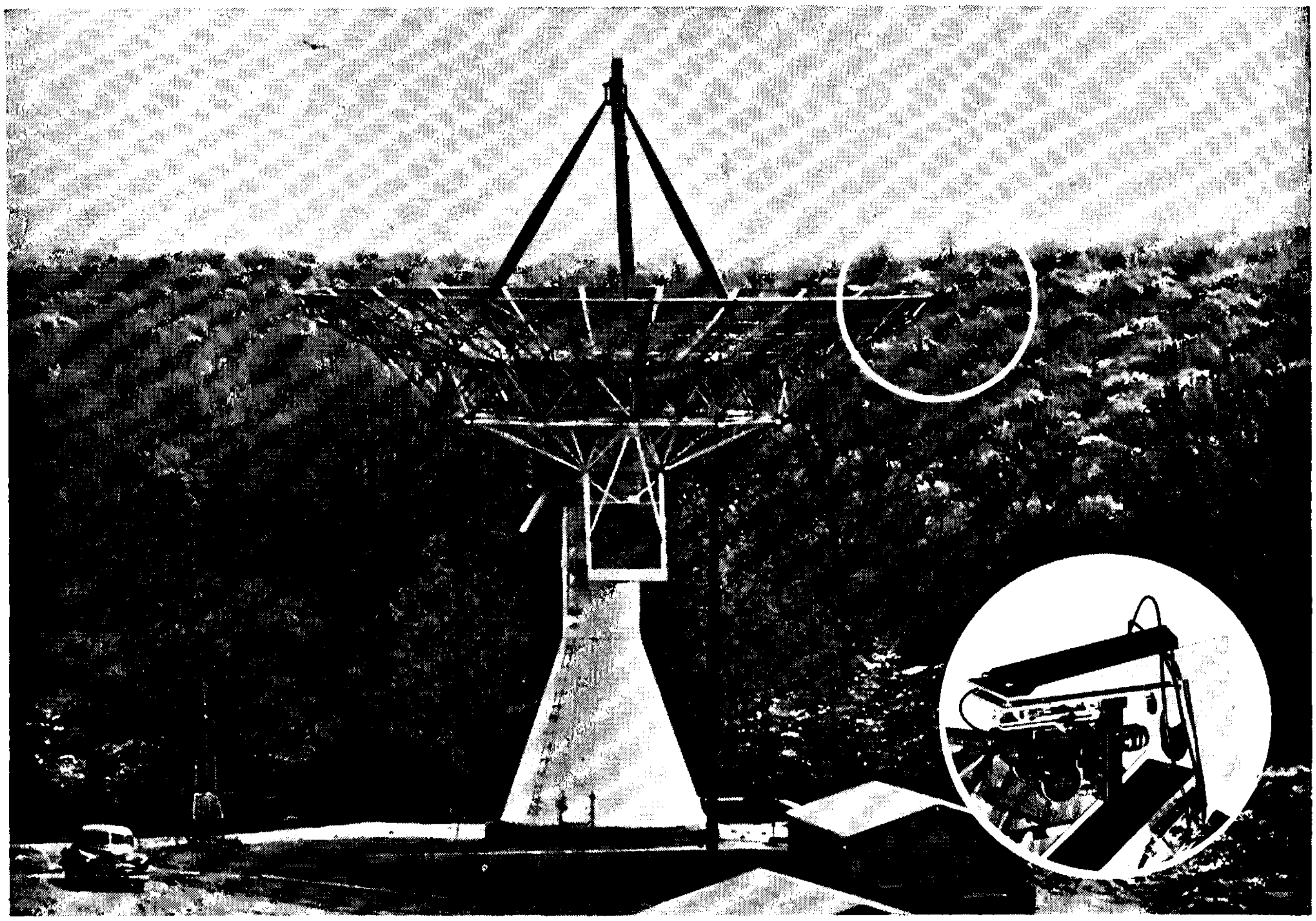

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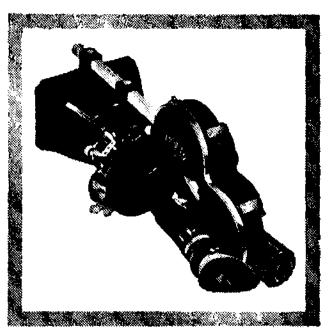

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Re: Errata in "A General Survey of High-Speed Photographic Techniques," *Jour. SMPTE, 71:* 915–920, Dec. 1962

Dear Sir:

An error in my recent article has been brought to my attention. On page 917, center column, 9 lines from bottom, the figure "50,000 rpm" should have been "500,000 rpm." The mistake appeared in the original copy and is regretted.

I have already received comments on this article from various people, which makes it appear that a more up-to-date "Comparison of Cameras" is desirable. It is hoped that this can be done in the reasonably near future.

February 19, 1963

George H. Lunn
United Kingdom Atomic Energy Authority
Atomic Weapons Research Establishment
Bldg. D3, Aldermaston, Berks., England

Dear Sir:

We have read in the December, 1962, *Journal* the very interesting article by Mr. George H. Lunn. The purpose of this letter is to submit some corrections to Table I, p. 919, giving performance data on Beckman & Whitley cameras.

(1) B&W Model 189 Framing Camera resolution at *full aperture on Plus X Film* is 34 lines/mm instead of 20 lines/mm. Using this actual resolution figure, the figure of merit for the B&W Model 189 becomes 1.2×10^9 instead of 7.3×10^8. The figures as given in Table I were apparently taken from our published specifications giving performance data with a special diamond-shaped aperture stop which cuts down resolution, but increases shuttering efficiency.

Although optical resolution of the Model 189 is much higher than 34 lines/mm, we have given resolution *on film* because the resolution in the Model 189 is film-limited.

Mr. Lunn does not specify whether the film resolution factor is included in the figure of merit data for the other instruments listed, but his terminology for "n" suggests that the film resolution factor is included.

(2) B&W Model 339B Streak Camera is capable of yielding time resolution of 2×10^{-8} seconds instead of 4.5×10^{-8} as shown.

We would also like to point out that Schardin's formula gives a figure of merit applicable only in the time direction of the film record. Better resolution in the space direction, of course, provides more space "data points" which are needed for many applications, and, therefore, must be considered in evaluating the worth of a system. One useful approach to an economic figure of merit for multiple-frame high-speed photoinstruments is to divide the number of frames times the number of data points per frame by the instrument cost ($(f \times d)/\text{cost}$). The higher the number, the greater is the economic value.

March 13, 1963

John C. Beckman, President
Beckman & Whitley, Inc.
San Carlos, Calif.

Re: Errata in "Vidicon Light-Transfer Characteristics and Film Reproduction," *Jour. SMPTE, 70:* 791–794, Oct. 1961

Dear Sir:

I have found interesting the excellent paper by Mr. Neuhauser in the October, 1961, *Journal*.

I read that the three curves in Fig. 5 are constructed from the characteristics of Figs. 1, 3 and 4: the vidicon characteristics, the film density characteristics and the picture-tube characteristics, respectively, and the values in column B; and that columns C and D of Table I were derived from Fig. 4, picture-tube characteristics.

It seems that in the case of original scene brightness of 10%, for example, video signal required is derived for picture tube with stray light of 5% and 0% are 30% and 42% from Fig. 4, respectively. Then it would seem that the values in columns B and D are opposite from one another, and also that the curves of stray light of 5% and 0% are opposite.

Some details about the derivation of the data in Table I would be welcomed as clarification.

January 8, 1963

Masahiko Fukuda
Head of TV Cinema Controlling Section
Tokai TV Broadcasting Co.
7-Toshin-Cho, Higashi-Ku
Nagoya, Japan

Dear Sir:

Mr. Fukuda is indeed correct in his assumption that something is wrong in the paper as presented. I find in looking through my original manuscripts that there was a change made somewhere along the line that reversed the headings of columns B and D of Table I.

Column B should represent the required drive of the picture tube with zero stray light and column D should represent the required drive of the picture tube with 5% stray light. Also, the curves of Fig. 5 should be re-labeled so that the lower curve represents the gamma corrector characteristics with the assumption that 5% stray light is on the picture tube and the upper curve should represent the gamma corrector characteristics with no stray light on the kinescope.

I am very thankful to Mr. Fukuda for pointing this out so that all possible steps can be taken to advise readers of the errors in the *Journal* paper.

Feburary 25, 1963

R. G. Neuhauser
Camera Tube Engineering
Radio Corp. of America
Lancaster, Pa.