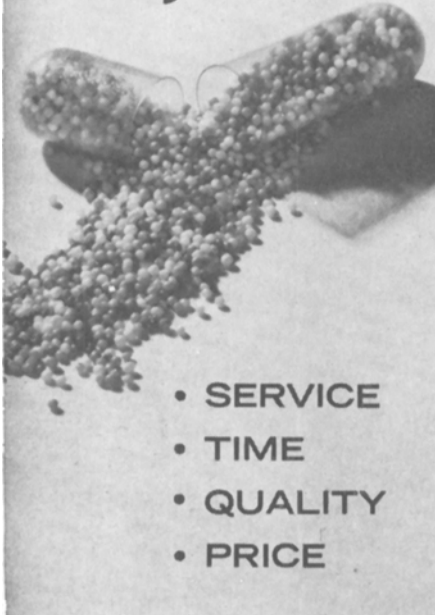


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## A New Fine-Grain Duplicating Positive Film

By W. H. BAHLER, R. A. MORRIS and F. W. SPANGLER

OVER THE PAST DECADE it has been recognized that any improvements in the materials used in the black-and-white duplicating cycle that would raise the overall reproduction quality level or provide easier handling procedures for the laboratory would be most welcome. One very desirable goal has been to improve the system to provide greater sharpness and lower graininess in the final reproduction. Another important aim, one of distinct interest to the laboratory, has been to increase the speed of the duplicating films. A faster film permits easier placement of the essential scene information on the characteristic curves of these materials and thus may effect an improvement in overall linearity of the tone reproduction cycle.

As a first step in this program, and one which has not previously been reported, Eastman Fine Grain Panchromatic Duplicating Negative Film, Types 5234 and 7234, was introduced in 1959. This film replaced the earlier product of the same name but designated as Types 5203 and 7203. The new film provided more than twice the speed of the earlier product and exhibited noticeably better sharpness characteristics. Granularity was not improved but this was not considered to be of major importance because it is well recognized that with modern fine-grain duplicating films the graininess observed in the final print is primarily a function of the granularity of the original negative. It should be noted, however, that the increased speed of the new film was obtained without any sacrifice in granularity and the granularity of the older product was already of a very low order of magnitude.

The second phase of the program has been concerned with improving the characteristics of the duplicating positive material. The new Eastman Fine Grain Duplicating Positive Film, Type 5366 and 7366, is about 0.60 log E faster than the present Eastman Fine Grain Duplicating Positive Film, Types 5365 and 7365. This makes possible a fourfold increase in printing speed. The new emulsion is coated on the same clear triacetate safety support that is used for other Eastman positive motion picture films.

Figure 1 shows the rms granularity curves for the new film and Type 5365.

Presented on September 29, 1964, at the Society's Technical Conference in New York by W. H. Bahler, Film Emulsion Div., Eastman Kodak Co., Kodak Park Works, Rochester, N.Y. 14650; R. A. Morris (who read the paper), Film Testing Div., Eastman Kodak Co., Kodak Park Works, Rochester, N.Y. 14650; and F. W. Spangler, Eastman Kodak Co. Film Emulsion Div. (This paper first received on September 18, 1964, received in condensed form on August 16, 1968.)

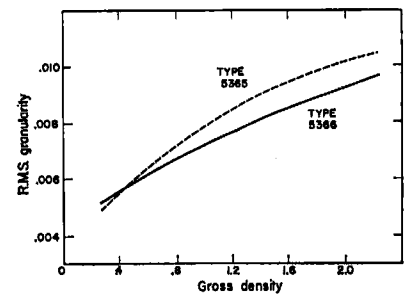


Fig. 1. Comparison of granularity.

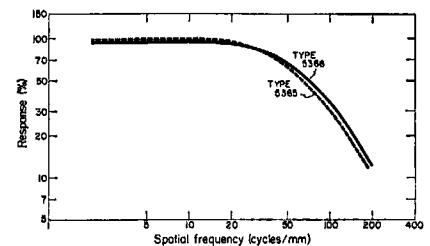


Fig. 2. Comparison of modulation transfer function.

The significant increase in printing speed has been accomplished with no increase in granularity. The modulation transfer curves are shown in Fig. 2. Combining the fine grain and sharpness with a four-fold increase in speed, we have a duplicating positive film of excellent quality. The color sensitivity of the new film is unchanged from that of Type 5365. The latent-image characteristics of the two films are very similar, but with extended room-temperature storage after exposure and before processing, the new film will reflect a slight increase in contrast.

The new film is designed to be developed in a negative developer such as Kodak D-76 or D-96 for about the same development time as the current Type 5365.

Figure 3 shows a family of characteristic curves for a range of development times at 68 F, as well as the corresponding time-gamma curve.

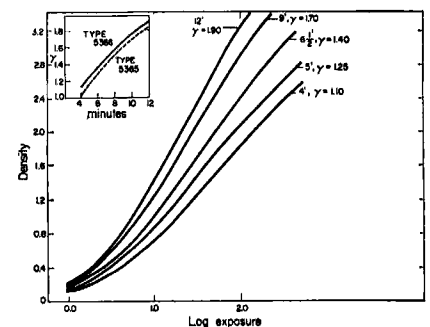


Fig. 3. Range of development of Type 5365 at 68 F.