

Condensations of Conference Papers

Society editorial policy and budget now allow us to publish a type of conference program paper that has been wanting attention. The following papers are typical of important presentations of new films or processing procedures that are best presented in full with films projected at conferences. It is hoped that future similar papers from conference programs can be published more promptly.—PIERRE MERTZ, Chairman, SMPTE Board of Editors

A New High-Speed Black-and-White Camera Negative Film

By W. H. BAHLER, M. L. JUDD, F. W. SPANGLER and A. L. WILLIAMS

THE NEED FOR films having higher speed and lower granularity has always provided new goals for developmental programs in the field of emulsion technology. For a number of years Eastman Tri-X Panchromatic Negative Film has been used where pictures needed to be made under extremely poor lighting conditions. Although Tri-X has served this purpose well, a still faster film would be useful in newsreel, industrial and night photography.

Recent advances in emulsion technology have made it possible to manufacture a film having nearly two times the speed of Tri-X with no increase in granularity. The new film is called Eastman 4-X Panchromatic Negative Film, Types 5224 (35mm) and 7224 (16mm).

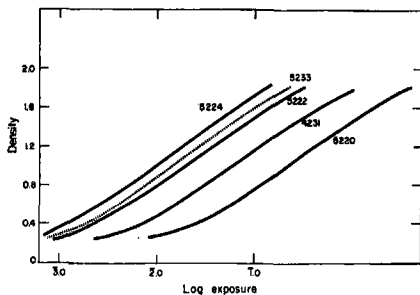


Fig. 1. The speed of the new film in comparison with Tri-X, Double-X, Plus-X and Eastman XT Panchromatic Negative film, Type 5220.

The new product is coated on the same gray triacetate safety support that is used for other Eastman negative motion picture films. Figure 1 shows the speed of the new film compared with Tri-X, Double-X, Plus-X and the new low-speed negative — Eastman XT Panchromatic Negative Film, Type 5220.

The increase in speed has been accomplished with no significant increase in granularity. Granularity (rms) measurements made at a gamma of 0.70, comparing the new film with Tri-X, are shown in Fig. 2.

Presented on September 29, 1964, at the Society's Technical Conference in New York by W. H. Bahler, M. L. Judd and F. W. Spangler, Film Emulsion Div., Eastman Kodak Co., Kodak Park Works, Rochester, N.Y. 14650; and by A. L. Williams (who read the paper), Film Testing Div., Eastman Kodak Co., Kodak Park Works, Rochester, N.Y. 14650. (This paper first received on April 7, 1965, received in condensed form on August 16, 1968.)

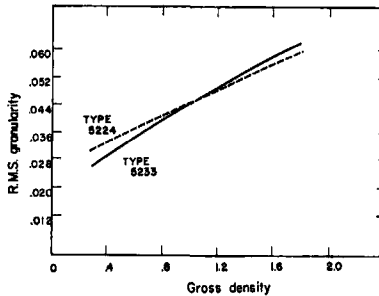


Fig. 2. RMS granularity measurements comparing the new film with Tri-X.

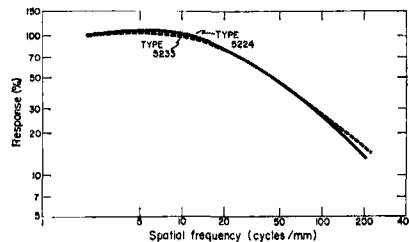


Fig. 3. Modulation transfer characteristics.

In addition, the modulation transfer characteristics in Fig. 3 show the new film to have the same properties as Tri-X to produce sharp images. The increased speed of the product provides the cameraman with an excellent high-speed negative film capable of providing adequate exposure in extremely adverse lighting situations. It should be emphasized that adequate exposure can frequently be obtained even when the illumination is so low that a reading cannot be obtained with a meter, especially where reflection meter measurements are used. In these cases it will be necessary for the cameraman to base his exposure on the results of practical tests. The new film should find extensive use in newsreel, industrial and night photography when the existing light level is considered very poor for adequate exposure.

The exposure indexes recommended for Eastman 4-X when developed to a gamma of 0.65 to 0.70 are Daylight 500 and Tungsten 400. The spectral sensitivity curves, Fig. 4, show the new film to be very similar to Tri-X. This likeness is reflected in the filter factors listed in Table I.

Processing

The development time for the new negative is about the same as that for Tri-X. A time of 7 to 9 min in a developer

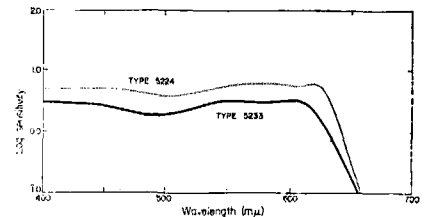


Fig. 4. Spectral sensitivity curves.

such as D-96 (immersion-type process) and 1 to 2 min in a high-activity spray-type process will give a gamma of 0.65 to 0.70. The fixing, washing and drying conditions are similar to those used for the Plus-X and Double-X films. The specific processing conditions, of course, must be based on sensitometric data obtained from the customer's machine since developer formulation, machine design, agitation and temperature all have a direct effect on the speed and contrast of the film-process system.

The new film is not intended for high-temperature processing. In the handling and storage of raw stock and processed film, the same precautions recommended for the other black-and-white negative films should be observed. Figure 5 shows a family of characteristic curves for a range of development times in a continuous immersion-type machine using D-96 developer.

Table I. Filter Factors for Daylight.

Kodak Wratten Filter No.	Filter factor	
	Tri-X	4-X
3 (Aero 1)	1.5	1.5
8 (K2)	2	2
12 (Minus Blue)	2.5	2.5
15 (G)	3	3
21	3.5	3.5
23A	5	5
8N5	5	5
25	8	8
29	25	25

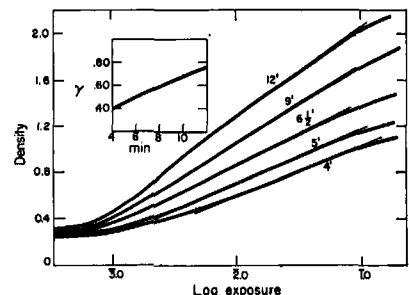


Fig. 5. Characteristic curves.