

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

PROCESSING INSTRUCTIONS
FOR BLACK AND WHITE FILMS
USING STANDARD ARMED FORCES DEVELOPERS

Headquarters, Department of the Army, Washington, D.C.

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1. Purpose. This technical bulletin provides guidelines for the manual processing of a variety of black and white photographic films using standard Armed Forces Developers No. 2 and 3.

2. Reporting of Technical Bulletin Improvements. The reporting of errors, omissions, and recommendations for improving this bulletin by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forwarded direct to: Commander, US Army Electronics Command, ATTN: AMSEL-MA-SNV, Fort Monmouth, NJ 07703.

3. Processor. Since operating personnel are trained and qualified in the use of the processing equipment, no instructions concerning its operation are contained in this bulletin.

4. General Film and Processing Information.
a. Exposure Number (ASA Speed). This number is for use with meters and cameras marked with ASA speed or exposure indexes in either daylight or artificial light. It will normally lead to the exposure required to produce negatives of high quality. If, with normal development, the negatives are consistently too thin, the exposure should be increased by using a lower number. If the negatives are too dense, the exposure should be reduced by using a higher number.

b. Storage. Keep unexposed film at 75°F. or lower. After exposure, film should be processed as soon as possible.

c. Developers.

(1) Armed Forces Developer No. 2, Medium Contrast Film Developer, MIL-D-4825A (Equivalent

to Eastman Kodak DK 50), FSN 6750-153-8909 for 1-gal. size, FSN 6750-266-7627 for 3½ gal. size.

(2) Armed Forces Developer No. 3, Low Contrast Film Developer, MIL-D-4826C, (Equivalent to Eastman Kodak D76), FSN 6750-153-8911 for 1-gal. size, FSN 6750-266-7628 for 3½ gal. size.

d. Agitation. Agitation should be 15 seconds to start and 5 seconds every minute thereafter.

e. Rinse. Rinse for 30 seconds in any photographic stop bath.

f. Fixer. Instructions for the specific Fixer used should be followed. Generally, 5 to 10 minutes for regular fixer and 2 to 4 minutes for rapid fixer is adequate.

g. Washing. Wash for 20 to 30 minutes in running water.

NOTE

The temperature of the solutions used to rinse, fix, and wash, should be within 5°F. of the temperature of the developer, but never higher than 80°F.

h. Drying. Dry under dust-free conditions.

5. Variability of Results. Many factors in the photographic process play an important role in the formation of the final image on the negative. If the use of the charts listed in table 1 does not produce the desired results, the factors listed below should be carefully considered as possible sources of error.

a. Camera Error. The f stop and shutter speed determine the light exposure the film receives. The malfunction of equipment or operator error can cause exposure error.

b. Exposure Meter. The malfunction or misuse of the exposure meter can also contribute to exposure error.

c. Film. The sensitivity, fog, and contrast of the film are all affected by its age and storage history. As film ages, the sensitivity generally decreases. If storage conditions are other than optimum, the deterioration is accelerated. Different emulsion batches of a given film type can also exhibit different sensitometric characteristics.

d. Processing Temperature. Improper thermometer calibration, temperature reading errors, or inability to control process temperature in the field situation

can contribute significantly to the loss in quality of the end product.

e. Agitation. The developer agitation, the size and volume of the developing tank, and the type and number of the films processed, are some of the factors that can affect the end product.

f. Developer Condition. The developer should be maintained in the optimum "fresh" condition during use, or the process results will vary. Improper mixing or replenishment, developer contamination, or aerial oxidation of the developer in use will produce less than satisfactory results.

Table 1. Time-Temperature Processing Instructions

Material to be processed	ASA Exposure Index	Developer	Temperature/Developing Time (minutes)		
			65°	70°	75°
35 MM ROLL FILMS					
Kodak Tri-X Pan	400	AFD #2(1-1)	7½	6	4½
		DK 50(1-1)	6½	5½	5
		AFD #3	9½	8	7
		D 76	11	8	6
Kodak Plus-X Pan	125	AFD #2(1 1)	5½	4½	3¾
		DK 50(1.1)	5	4¼	3½
		AFD #3	8	7	5¾
		D76	8	6½	5
Kodak Panatomic-X	32	AFD #3	10	8	6
		D76	9	7½	6
GAF Professional, Type 2681	250	AFD #2(1 1)	8¾	6½	5
		Isodol (1 1)	5½	4¾	4¼
		AFD #3	11	8¾	7
		Hyfinol	5½	4¾	4¼
GAF 125 Black and White	125	AFD #2(1 1)	7¾	6	4½
		Hyfinol	4¾	—	3
		AFD #3	9	7	5¾
		Isodol (1 1)	6	—	3¾
120 ROLL FILMS					
Kodak Royal-X Pan	1250	AFD #2(1-1)	7	6	5¾
		DK 50 (1.1)	6½	5½	5
Kodak Verichrom. Pan	125	AFD #3	9	7	6
		D76	8	6½	5
GAF 125 Black and White	125	AFD #2(1)	7¾	6	4½
		Hyfinol	4¾	—	3
		AFD #3	9	7	5¾
		Isodol(1.1)	6	—	3¾

Material to be processed	ASA Exposure Index	Developer	Temperature/Developing Time (minutes)		
			66°	70°	75°

220 ROLL FILMS

Kodak Tri-X Pan Professional, TXP 220/120	320	AFD #2(1:1)	6%	5%	5
		DK 50(1:1)	6%	5%	5
		AFD #3	10	8%	7½
		D76	10	8%	7
Kodak Plus-X Pan Professional, PXP 220/120	125	AFD #2(1:1)	6%	4%	3½
		DK 50(1:1)	5	4%	3½
		AFD #3	9	7	5½
		D76	8	6%	5

4 x 5 CUT SHEET FILMS

Kodak High Speed Infrared Film, Type 4143	—	AFD #3	16	—	12
		D 76	10	—	7½
Kodak Royal-X Pan, Type 4166	1250	AFD #2	6	5%	4%
		DK 50	6½	5%	5
Kodak Royal Pan, Type 4141	400	AFD #2	6%	5½	4½
		DK 50	5½	4%	4%
		AFD #3	11	9½	8
		D 76	11	9½	8
Kodak Tri-X Pan Professional, Type 4164	320	AFD #2(1:1)	10	8½	7
		DK 50(1:1)	10	8½	7
		AFD #3	10	8½	7
		D 76	10	8½	7
Kodak Tri-X Ortho, Type 4163	320	DK 50(1:1)	10	8½	7
		AFD #3	10	8½	7
		D 76	10	8½	7
Kodak Super XX Pan, Type 4142	200	AFD #2	8	6½	5
		DK 50	8	6½	5
Kodak Plus-X Pan Professional, Type 4147	125	AFD #2(1.1)	7%	6	4%
		DK 50(1:1)	6½	5%	5
		AFD #3	—	8½	7
		D 76	9	7½	6
Kodak Commercial Film Type 6127	50	AFD #2	2½	—	—
		AFD #2(1:1)	3%	—	—
		DK 50	2	—	1%
		DK 50(1:1)	3%	—	2½
GAF Professional, Type 2863	500	AFD #2(1:1)	12	8%	7
		Isodol	4½	3½	2%
		AFD #3	—	—	—
		Hyfinol	6	4%	3%
GAF Superpan Gafstar, Type 2881	250	AFD #2(1.1)	10%	8	6½
		Isodol	3%	2%	2½
		AFD #3	10½	8%	7
		Hyfinol	5½	4%	4%

Material to be processed	ASA Exposure Index	Developer	Temperature/Developing Time (minutes)		
			65°	70°	75°
GAF Versapan Gafstar, Type 2831	125	AFD #2(1:1)	7½	6	4½
		Isodol	3½	3	2½
		AFD #3	10	8	6½
		Hyfinaol	4½	3½	3½

FILM PACK FILMS

Kodak Tri-X Pan Professional	320	AFD #2(1:1)	7½	6	4½
		DK 50(1:1)	6½	5½	5
		AFD #3	—	9	7½
		D 76	10	8½	7
Kodak Plus-X Pan Professional	125	AFD #2(1:1)	5½	4½	3½
		DK 50(1:1)	5	4½	3½
		AFD #3	9½	7½	6
		D 76	8	6½	5

Note. Avoid development times under 5 minutes if possible, because poor uniformity may result.

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NG: None

USAR: None

For explanation of abbreviations used, see AR 310-50.

END

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DATE





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