

The Care and Cleaning of Stainless Steel Used in KODAK Processing Equipment



Introduction . . . some facts about stainless steel.

Stainless steel is used in photographic processing equipment because of its ability to resist corrosion and maintain its appearance. Stainless steel relies on a thin, transparent, nonporous surface layer of complex oxides to resist corrosion and pitting. This layer of oxides will normally form rapidly on clean stainless steel when it is exposed to air. If this oxide layer is disturbed, and a contaminant left behind, the corrosion-resisting properties of stainless steel will decrease and the metal will corrode, pit, and eventually rust. The thin oxide layer can be disturbed by an accumulation of general dirt, chemical deposits, or condensed chemical vapors. Deposits can act as a contaminant and help "starve" the stainless steel for oxygen, thus reducing the effectiveness of the protective oxide layer. In addition, oxygen starvation can be created within a processor by chemical fumes.

Stainless steel can keep its "stainless" properties or be *restored* to its "stainless" state via simple, *continuous* cleaning procedures. These cleaning procedures are called "passivating"; that is, making the steel passive and inactive, and thus corrosion resistant. Even if stainless steel is pitted and rusting, it can be restored with only the pitted areas remaining.

Read and follow these cleaning instructions to obtain maximum service from the stainless steel in your Kodak equipment.

General Cleaning

To remove general dirt and chemical deposits, use a sponge or a fiber brush and hot water. Use care when rinsing with hot water to prevent damage to components of the processor. After cleaning, immediately dry the stainless steel with a soft, clean cloth.

To remove more stubborn deposits and stains, use a sponge or a cloth, and a paste made from a mild abrasive cleaner such as Bon Ami, Vulcan Pumice, or an equivalent cleaner. Apply the paste in the direction of the original finish on the stainless steel. For stubborn deposits and stains, use a fiber brush or a stiff plastic scouring sponge (usually found in supermarkets for scouring pans) and the scouring paste. Use scouring sponges sparingly; because even though they feel fairly soft, they can scratch the stainless steel. Fine-textured stainless steel wool may also be used, with care. Never use regular steel wool! After cleaning, rinse and immediately dry the stainless steel with a soft, clean cloth.

In some areas, hard water will leave white deposits. These deposits can be eliminated by quickly drying stainless steel. Water spots that are already present may be removed with vinegar or a commercial water softener. Always rinse and quickly wipe dry.

Iron from the plumbing can leave a rust film if the rinse water is allowed to dry by itself. This is why you should always quickly dry stainless steel after rinsing.

Heavy-Duty Cleaning

Occasionally you may encounter stains and deposits that resist general cleaning techniques. These stains and deposits can be removed with commercial cleaners and rust removers such as Oakite 33 (Oakite Products Co.), WO-2 (Turco Products Co.), or an equivalent cleaner.

WARNING

Commercial cleaners, such as Oakite 33, can cause contamination of photographic chemicals, especially lithographic-type developers. Commercial cleaners are NOT RECOMMENDED for cleaning processor tanks or racks. For processor tanks and racks, use the cleaning procedures described earlier.

These cleaners usually contain solvents, detergents, and an acid such as phosphoric acid. Follow the manufacturer's instructions and use safe chemical handling practices such as using proper mixing vessels, rubber gloves, eye protection, and aprons.

After preparing the cleaner, flush the stainless steel with water and swab the cleaner over the area with a cloth or sponge. Allow the solution to soak the stained area for 5 or 10 minutes; then scrub with a cloth, brush, or plastic sponge. Rinse and dry.

When properly used, these cleaners will not harm stainless steel but they may harm paint, galvanized steel, fabrics, and rubber.

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General Precautions

- 1) If you must use a scraper to remove deposits, use a stainless steel scraper. If a common steel scraper is used, the area that was scraped should be scoured with aluminum oxide abrasive paper and then cleaned as described in "Heavy-Duty Cleaning."
- 2) In cleaning, give special attention to joints and welds.
- 3) Don't splash cleaning solutions on vulnerable surfaces.
- 4) Don't let stainless steel come in contact with steel or iron, such as nails, rusty shelves, etc.
- 5) Always rinse thoroughly and wipe dry.

Use the following easy "Do and Don't" guidelines.

DO

Wipe up chemical spills and deposits.

Use proper cleaning tools and chemicals.

Rinse and dry stainless steel quickly.

Keep stainless steel parts away from common steel and iron.

Clean *all* stainless steel parts.

Clean stainless steel regularly to maintain its protective oxide coating.

DON'T

Allow deposits to harden.

Use steel wool or common steel scrapers. Avoid using harsh plastic sponges. Don't use cleaners other than those recommended. **DO NOT** use hydrochloric or muriatic acid.

Allow rinse water to dry by itself.

Hang stainless steel parts from nails or steel brackets. Don't put stainless steel parts on rusty shelves.

Overlook stainless steel parts that are not submerged in solutions.

Put off cleaning stainless steel components.



EASTMAN KODAK COMPANY • Rochester, N.Y. 14650



SERVICE BULLETIN

KODAK X-OMAT Processor

Eastman Kodak Company/Customer & Technical Services/Health Sciences Markets Division/Rochester, New York 14650

REVISED OCTOBER 1981

SEVICE BULLETIN NO. 22

Processing Recommendations For KODAK Industrial X-OMAT Processor, Model B

The following tables list the current recommendations for chemical-replenishment rates and processing temperatures for the KODAK Industrial X-OMAT Processor, Model B, when using KODAK INDUSTREX Films and KODAK X-OMAT Duplicating Film with KODAK INDUSTREX Chemicals. These recommendations supersede those given previously in KODAK Industrial X-OMAT Processor Publications.

	Model B Normal Cycle	Model B Reduced Cycle (8 minutes)
DEVELOPER STARTER	32 fl oz (0.95 litre)	32 fl oz (0.95 litre)

NOTES:

When filling the processor with fresh developer replenisher, first pour a small amount of replenisher into the tank, add the KODAK INDUSTREX Developer Starter, and then add the balance of the replenisher. This will provide thorough mixing of the starter with the replenisher.

For roller-transport-type x-ray film processors with tanks of other capacities, use 3.2 fluidounces of developer starter for each U.S. gallon (25 mL per litre) of developer replenisher.

	Average Film Density	Developer	Fixer
Chemical Replenishment (Per 14-Inch Length of Film)	3.0 4.0	90 mL 100 mL	170 mL 150 mL

Drain, clean, and refill the developer tank every three to six months (or as experience indicates). For low-volume operation (use of about ten gallons or less of developer replenisher per week) drain and refill the developer tank after three weeks.

Do not store mixed developer replenisher longer than two weeks.

Change the 10-Micron developer filter cartridge after processing 2,000 to 3,000 14 x 17-inch films or the equivalent.

PROCESSING TEMPERATURES	Model B Normal Cycle	Model B Reduced Cycle (8 minutes)
Developer	81 ± 1°F (27 ± 0.6°C)	86 ± 1°F (30 ± 0.6°C)
Water	77 ± 2°F (24 ± 1°C)	82 ± 2°F (26 ± 1°C)
Dryer*	120 ± 5°F (49 ± 2.8°C)	125 ± 5°F (52 ± 2.8°C)

*Use lowest possible temperature consistent with good drying.

If other films or chemicals are used, the manufacturers should be asked for their recommendations before changes in replenishment rates are attempted.

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TEMPORARY INSTRUCTIONS

FOR

KODAK INDUSTRIAL X-OMAT FILM FEEDER

MODEL 5-K

3,630

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KODAK INDUSTRIAL X-OMAT FILM FEEDER

MODEL 5-K

IMPORTANT: Read this supplement before proceeding with the installation of the film feeder.

DOUBLE-THICKNESS DETECTOR MICRO SWITCHES

To further increase the effectiveness of the double-thickness control on the KODAK Industrial X-OMAT Film Feeder, Model 5-K, another Micro Switch and a new lower detector roller assembly (467247) have been added.

The center Micro Switch has been removed and replaced with two Micro Switches installed off center. The adjustment of these switches is the same as for the center Micro Switch. Adjust one switch at a time.

Radiography Markets Division

EASTMAN KODAK COMPANY • ROCHESTER, N. Y. 14650

SECTION I -- INTRODUCTION

1-1. The KODAK Industrial X-OMAT Film Feeder, Model 5-K, figure 1, is designed for use with the KODAK Industrial X-OMAT Processor, Model B.

1-2. The feeder replaces the film feed tray on the processor and automatically feeds single 14 by 17-, 11 by 14-, and 10 by 12-inch films. Films 8 by 10 and 7 by 17 inches are fed simultaneously side by side. Films 4 1/2 by 17, 3 1/2 by 17, 4 1/2 by 15, 4 1/2 by 10, and 5 by 7 inches, as well as 70 mm lengths, can be fed in pairs or three abreast. If films are fed three abreast, the center suction cup must be used. Film sizes can be intermixed, except that a single 8 by 10-inch or smaller film must not be placed on top of a film 10 or more inches wide.

1-3. The feeder has a lighttight lid that permits processor operation in normal room light. Loading must be done in the dark or under safelight conditions. (Use a 7 1/2-watt frosted bulb in a safelight lamp with a KODAK Safelight Filter, WRATTEN Series 6B, mounted at least four feet above the feeder.)

1-4. The operation of the film feeder is independently controlled except that the center Micro Switch on the detector rollers of the processor automatically shuts off the feeder when no film is being fed or at the completion of feeding a stack of film.

1-5. When the feeder is ready for operation and the toggle switch is turned on, the roller-drive and the mechanism-drive motors start. The mechanism-drive motor operates the vacuum pump. The top film,

or pair of films, is lifted to the detector rollers by suction cups attached to a movable arm. The film entering the detector rollers opens either or both of the end Micro Switches which stops the mechanism-drive motor and the vacuum pumps. This releases the film from the suction cups. The roller-drive motor continues to run, permitting the film to be picked up by the detector rollers of the processor. When the film is clear of the feeder detector rollers, the mechanism-drive motor again starts and repeats the cycle. Each cycle of the feeder takes approximately 12 seconds, which allows the proper film spacing. When the last film reaches the detector rollers, the feeder makes two or more complete cycles before shutting off. The safelight then comes on, signalling that the lid can be opened.

1-6. If two thicknesses of film or a damaged film is fed into the detector rollers, the center Micro Switch on the feeder opens. This stops the roller-drive motor and sounds a buzzer which continues to sound until the films are removed, permitting the roller-drive motor to restart.

1-7. The blower, which runs continually while the processor disconnect switch is on, ruffles the films to prevent their sticking together.

SECTION II -- INSTALLATION

2-1. Shut off the main power supply to the processor.

2-2. Remove the feed stand from the processor.

2-3. Change the duplex three-wire receptacle on the processor to a four-wire receptacle (furnished) as follows:

a. Remove the electrical control panel cover.

b. From the three-wire receptacle remove the two white (neutral) wires, the two yellow wires No. 22, and the green (ground) wire.

c. Install the four-wire receptacle. Connect the two white (neutral) wires to terminal X on the receptacle, the two yellow wires No. 22 to terminal Y, the green (ground) wire to terminal GR, and the black wire (furnished) to terminal Z on the receptacle and terminal No. 13 on the terminal strip. (See view of receptacle on wiring diagram.)

2-4. Replace the electrical control panel cover.

2-5. Remove and retain the DUMMY SCREWS, figure 2, from the feed end panel of the processor. Using the holes that correspond to the holes in the processor, and with existing 8-32 x 3/8 screws install the ADAPTER PLATE, figure 3.

2-6. Before disassembling the feeder for installation, be sure that the LOWER FILM GUIDE LIP, figure 4, is straight, parallel to the film opening, and perpendicular to the face of the feeder. If the lip is distorted, realign it carefully.

2-7. Remove two screws from the front and two screws from the bottom of the feeder and remove the COVER ASSEMBLY, figure 1. To separate the DETECTOR ASSEMBLY, figure 5, and the MECHANISM ASSEMBLY, disconnect the plug from the bottom center of the feeder and remove the five holding screws.

2-8. To prevent light leak when the feeder is mounted to the processor, apply the adhesive-backed gasket material around the rear opening of the detector assembly. See figure 4.

2-9. Place the detector assembly against the adapter plate and fasten with four No. 8-32 screws and lockwashers (furnished).

2-10. Before attaching the mechanism assembly to the detector assembly, check the adjustment of the detector-roller Micro Switches. To do this, proceed as follows:

a. Insert the four-prong feeder PLUG, figure 5, into the processor receptacle and turn on the main power. AVOID ELECTRICAL SHOCK; use extreme care when adjusting the Micro Switches.

b. Loosen the ADJUSTING NUT for the center (DOUBLE-THICKNESS DETECTOR) MICRO SWITCH, figure 6, until the plunger is out of contact with the detector roller. With no film between the detector rollers, adjust one of the end (SINGLE-SHEET DETECTOR) MICRO SWITCHES. Tighten the adjusting nut until the rollers start turning; loosen it until the rollers stop turning; then loosen it 1/8 turn farther. The rollers should turn when a single 4-inch-wide piece of film is inserted at any point between the detector rollers. Adjust the opposite end Micro Switch in the same manner.

c. Insert a single 4-inch-wide piece of film between the detector rollers directly above the center Micro Switch. Tighten the adjusting nut until the buzzer sounds; loosen it until the buzzer stops; then loosen it 1/8 turn farther. The buzzer should sound when a 4-inch-wide double thickness of film is inserted at any point between the detector rollers.

d. Before proceeding with the installation, TURN OFF THE MAIN POWER. After the mechanism assembly is installed, recheck the operation of the Micro Switches, following the procedure given in paragraph 4-10.

2-11. Put the mechanism assembly in position and fasten to the detector assembly with the five screws previously removed. Plug in the electrical connection.

2-12. Make the checks of the feeder referred to in the "PRE-OPERATION CHECK LIST", page 10.

2-13. With the two front screws previously removed, install the feeder cover assembly.

2-14. Use the two CLAMPS, figure 7, and the two bottom screws previously removed, to fasten the larger-diameter end of the feeder SUPPORT to the cover of the feeder. Extend the support to the position where the processor front meets the floor. To hold the support firmly in place, tighten the setscrews in the COLLARS at the tubing extension points. If the services interfere, extend the support as far as possible. With a No. 29 drill and an 8-32 tap, drill and tap two holes in the processor panel above the services. Using the two clamps and self-tapping screws (furnished), fasten the support to the panel.

IMPORTANT: When installing the support, do
not raise the front of the feeder.

2-15. Plug the feeder power cord into the four-wire receptacle.

2-16. Plug the safelight power cord into the SAFELIGHT RECEPTACLE, figure 1.

NOTE: Turn off the TOGGLE SWITCH, figure 7, any time

that the replenisher pump switch is turned off;
otherwise, the feeder will operate continually.

SECTION III -- OPERATION

3-1. Principles of Operation

3-2. The following paragraphs should serve as a guide to a better understanding of the operation of the feeder. The parenthetical symbols refer to the drawing symbols used on the wiring diagram, page 30.

3-3. When the wall disconnect is turned on, the blower (M2) runs continuously.

3-4. Closing the toggle switch (SW) starts the mechanism-drive and roller-drive motors (M1 and M3, respectively) through the normally closed relay contacts (R).

3-5. The motor (M1) drives the mechanism and the vacuum pumps, causing the header bar to start down to pick up film. The film is lifted and fed into the detector rollers which are driven by the motor (M3). Film entering the detector rollers causes either or both of the end Micro Switches (MS1 or MS2) to open, stopping the motor (M1) with the header bar in the top position but not yet causing the limit switch (LS) to open. This stops the vacuum pump, allowing the cups to release the film.

3-6. When the film leaves the detector rollers, the end Micro Switches (MS1 and MS2) are closed and the mechanism-drive motor (M1) restarts. The header bar continues forward, opening the limit switch (LS). The feeder continues to run through the normally closed relay circuit (R).

3-7. After the last film leaves the detector rollers of the processor the center Micro Switch of the processor causes a signal from the processor time-delay relay which energizes the feeder relay (R), opening the normally closed contact and closing the normally opened contact which locks in the relay.

3-8. When the header bar reaches the top position, the yoke contacts the limit switch (LS), opening the drive circuits (mechanism and roller) and causing the feeder to stop.

3-9. To restart the feeder after it has been loaded, turn the toggle switch (SW) first to the "OFF" position and then back to the "ON" position. This de-energizes the lock-in relay circuit (R) and allows the normally closed relay contact (R) to close until the limit switch (LS) is closed, permitting the feeder to restart the cycle.

3-10. When two thicknesses of film or a damaged film is fed into the detector rollers, the center Micro Switch (MS3) on the feeder detector roller is opened, stopping the roller-drive motor (M3) and causing the buzzer (BZ) to sound. Removal of the film permits the roller-drive motor (M3) to restart and stops the buzzer.

3-11. The feeder is rendered inoperative by opening the toggle switch (SW). However, if film is still going through the feeder detector rollers, the roller-drive motor (M3) will continue to run until the film clears the rollers. This is due to the fact that the Micro Switches (MS1 and MS2) are connected in their opened position directly to the live-voltage line.

NOTE: Turn off the toggle switch any time that the pump switch is turned off.

3-12. Pre-Operation Check List

3-13. Turn on the main power supply and the replenisher pump switch on the processor. Turn on the feeder TOGGLE SWITCH, figure 7, and check the following before initial operation. (To operate the feeder without film, the toggle switch must be turned off and on after the feeder stops.)

a. The HEADER BAR, figure 8, should pause on every cycle with the lips of the SUCTION CUPS (facing you) 1/2 to 5/8 inch above the ramp. The header bar should stop approximately 1 inch from the face of the mechanism assembly, as shown in figure 8.

b. The suction cups should come down so that they touch the FEED RAMP simultaneously.

c. The suction cups should return to a vertical position as they approach the detector rollers.

d. A substantial flow of air should be coming from the AIR SLOTS, figure 9.

3-14. With the center cup in its operative (down) position, place three 5 by 7-inch films abreast; turn on the remaining switches on the processor control panel; actuate the toggle switch; and check the following:

a. The suction cups should pick up the films simultaneously.

b. The detector rollers should accept the films simultaneously, and the header bar should stop promptly.

NOTE: Normally the feeder makes two complete cycles after the last film has been fed and then shuts off

automatically. The number of cycles before shutdown should be of no concern as long as the feeder operates satisfactorily.

c. Using the loading procedure outlined in the "OPERATION" section (paragraph 3-17), load the feed ramp with the various sizes of film to be processed. Observe the feeding of these films.

3-15. With the center cup in its inoperative (up) position, place two 8 by 10-inch films abreast; turn on the remaining switches on the processor control panel; actuate the toggle switch; and check as in steps a, b, and c of paragraph 3-14.

3-16. Should difficulty be encountered with any of the pre-operation checks, or should the feeder fail to operate properly, refer to the "HOW TO CORRECT DIFFICULTIES" section, page 21.

3-17. Operation

3-18. Plug the feeder power cord into the processor receptacle.

3-19. Turn on the main power supply and the switches on the processor control panel. (Before turning on the switches, be sure that the processor solution tanks are filled.)

3-20. Open the light-lock lid.

3-21. Load films into the feeder one at a time. Loading must be done in the dark or under safelight conditions. Keep the films against the outer edges of the FEED RAMP, figure 9, whenever possible. Center 10 by 12-inch films on the feed ramp with the 12-inch edge leading. Load 8 by 10-inch and 7 by 17-inch films in

pairs. Films 5 or less inches wide can be loaded three abreast. Films 10 by 12 inches or larger can be intermixed with the film sizes fed in pairs. However, films fed in pairs and three abreast cannot be intermixed. A single 8 by 10-inch or smaller film must not be placed on top of a film 10 or more inches wide, but can be placed under a film 10 or more inches wide; or it can be fed into the processor manually before the toggle switch is activated. It is recommended that no more than 15 films be stacked.

NOTE: When feeding films 5 or less inches wide three abreast, make sure that the center suction cup is put into the operative (down) position.

At all other times it should be in the inoperative (up) position.

3-22. Lower the GUIDE ROLLER onto the stacked film.

3-23. Close the light-lock lid. (This is necessary only when room lights are required.)

3-24. Turn on the feeder toggle switch.

3-25. After the last film has been fed, the feeder will cut off automatically after two complete cycles. To restart the cycling, turn the toggle switch first to the "OFF" position and then back to the "ON" position.

SECTION IV -- MAINTENANCE AND SERVICE

WARNING: Before servicing or replacing any electrical components, TURN OFF THE MAIN POWER.

4-1. Processor Adjustments

4-2. Detector Roller Assembly. Cleanliness of the detector rollers is very important. They should be wiped daily with a clean, damp cloth. The areas under the Micro Switch rollers are especially important. Be sure, however, that no attempt is made to feed film while the rollers are still damp.

4-3. If there is any hesitation of the detector rollers, examine the nylon worm gears for signs of wear, and replace them if necessary. These nylon gears should be lubricated occasionally. (See the Lubrication Chart in the processor service manual.) Check the sprocket and worm for signs of wear and worn or broken teeth.

4-4. Check the clearance between the top and bottom detector rollers for possible roller eccentricity. If the clearance at either end of the rollers is more than .004 inch, check the worm gears as explained above. If the gears appear to be in satisfactory condition, the roller or its shaft is probably out of round and should be replaced.

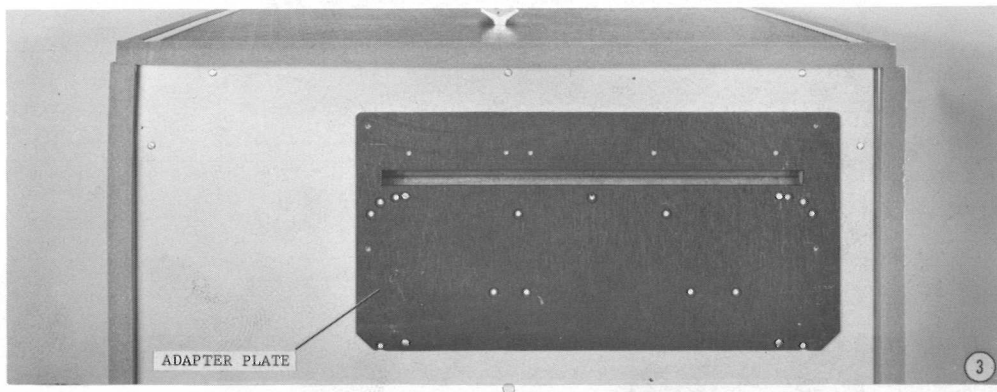
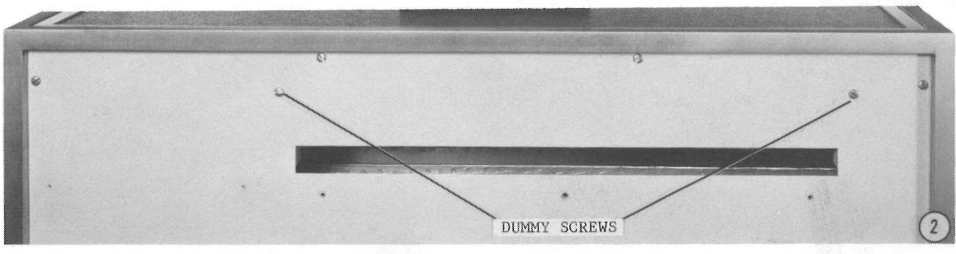
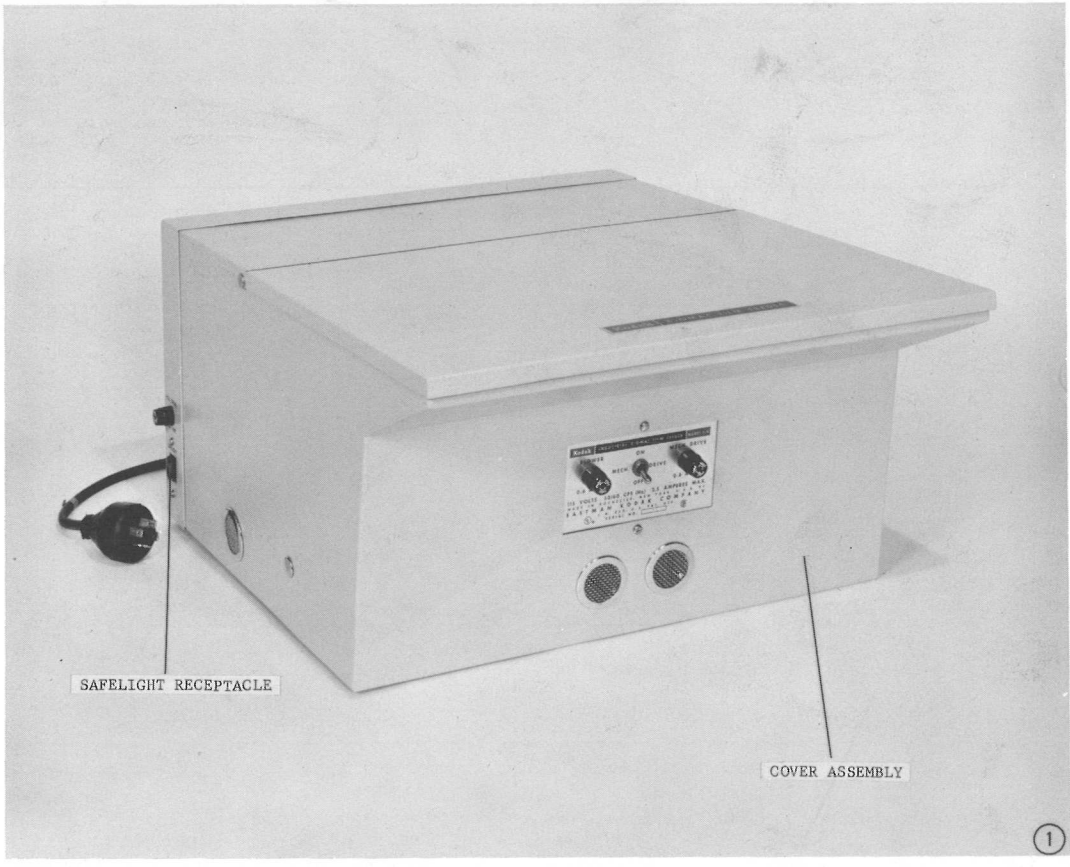
4-5. Double-Thickness Detector Micro Switch. To adjust the double-thickness detector Micro Switches, proceed as follows:

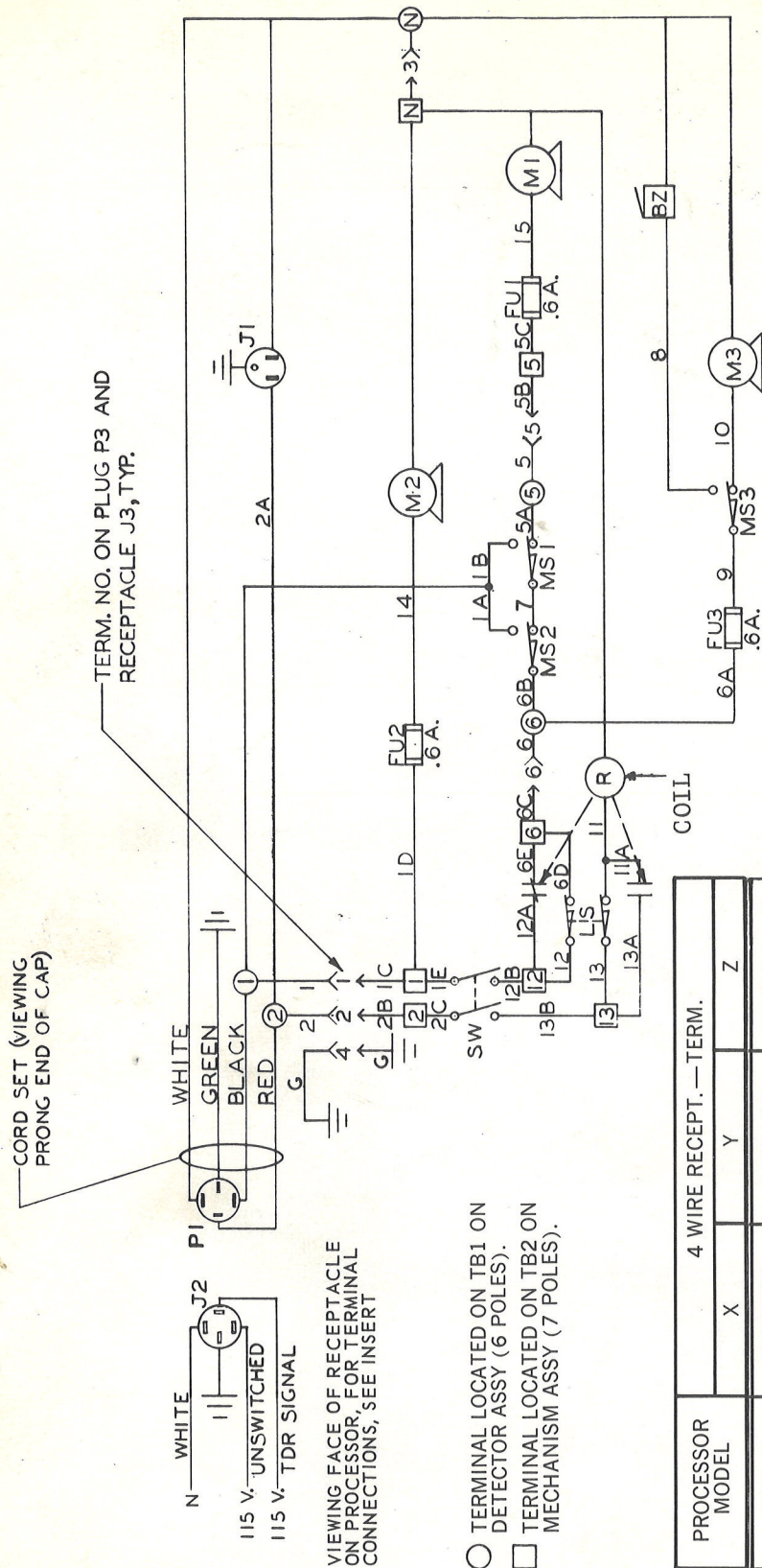
a. Insert a single 4-inch-wide piece of film between the detector rollers directly beneath one of the end Micro Switches. Turn the adjusting nut on the Micro Switch counterclockwise until the warning buzzer sounds. Then turn it in a clockwise direction until the buzzer stops. Loosen the nut 1/8 turn farther in a clockwise direction. Adjust the Micro Switch on the opposite side in the same

DIFFICULTY	POSSIBLE CAUSE	REMEDY
Density marks on films (from suction cups) (cont'd)	<p>Dirt on suction cups</p> <p>Header bar dropping on film</p> <p>Static</p>	<p>Clean suction cups. (See paragraph 4-15.)</p> <p>Check for excessive play in the drive cam system. (See paragraph 4-13.)</p> <p>Apply antistatic solution to suction cups, header bar, linkage, and all the way to ground.</p>
Erratic feeding cycle (feeder cutting on and off frequently)	<p>End Micro Switches at detector roller not set properly</p> <p>Dirty detector rollers</p> <p>Detector rollers turning in eccentric manner (out of round)</p> <p>Loss of drive on lower detector roller</p>	<p>Check and adjust end Micro Switches on feeder. (See paragraph 4-10a.)</p> <p>Clean rollers with a clean, damp cloth.</p> <p>Check rollers for concentricity. Replace, if necessary.</p> <p>Replace detector roller O rings.</p>
Films stubbing or striking top of film-guide ramp	Improper header bar movement	<ol style="list-style-type: none"> 1. Check springs for tension. (See paragraph 4-14a.) 2. Check pivot points for burrs. (See paragraph 4-14b.) 3. Lubricate pivot points. (See paragraph 4-14c.)
Suction cups not picking up films	Vacuum too low	Move vacuum-adjusting screw clockwise 1/8

DIFFICULTY	POSSIBLE CAUSE	REMEDY
Suction cups not picking up films (cont'd)	<p>Tubing pulled off header bar</p> <p>Tubing split</p> <p>Tubing binding</p> <p>Dirty suction cups</p> <p>Distorted suction cups</p> <p>Clogged orifice</p> <p>Drive arm improperly set</p> <p>Suction cups not touching the feed ramp simultaneously</p>	<p>turn at a time until proper vacuum is obtained. (See paragraph 4-21.)</p> <p>Refit tubing.</p> <p>Replace tubing as needed.</p> <p>Adjust path of tubing.</p> <p>Clean suction cups. (See paragraph 4-15.)</p> <p>Replace suction cups.</p> <p>Clean orifice. (See paragraphs 4-17 and 4-18.)</p> <p>Adjust drive arm. (See paragraph 4-11.)</p> <p>Align suction cups. (See paragraph 4-16.)</p>
Failure of detector rollers to accept films	End Micro Switches at detector rollers not set properly	Check and adjust setting of end Micro Switches. (See paragraph 4-10a.)
Films twisting	<p>Detector rollers dirty</p> <p>Detector rollers erratic (out of round)</p>	<p>Clean rollers.</p> <p>Replace rollers if necessary.</p>
Failure of air to strike leading edge of film	<p>Blower not operating</p> <p>Loose air-tube connection between</p>	<p>Check operation of blower and fuse. (See paragraph 4-26.)</p> <p>Check AIR TUBE, figure 5, to be sure it is fastened</p>

DIFFICULTY	POSSIBLE CAUSE	REMEDY
Failure of air to strike leading edge of film (cont'd)	blower motor and air plenum	securely to the feeder base.
Failure of feeder to shut off properly when feeder is empty	<p>Limit switch not tripping at beginning of each cycle</p> <p>Improper setting of center Micro Switch on processor</p> <p>Defective relay</p> <p>Defective limit switch</p> <p>Processor pump switch turned off</p>	<p>Set limit switch by <u>slightly</u> bending leaf spring. (See paragraph 4-12.)</p> <p>Adjust center Micro Switch on processor. (See paragraph 4-6.)</p> <p>Clean relay contacts or replace relay if necessary.</p> <p>Check switch with ohmmeter and replace if necessary.</p> <p>Pump switch must be on to allow feeder to shut off automatically.</p>





CORD SET (VIEWING PRONG END OF CAP)

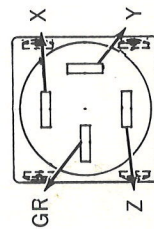
TERM. NO. ON PLUG P3 AND RECEPTACLE J3, TYP.

WHITE
N
115 V. UNSWITCHED
115 V. TDR SIGNAL
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VIEWING FACE OF RECEPTACLE ON PROCESSOR, FOR TERMINAL CONNECTIONS, SEE INSERT

- TERMINAL LOCATED ON TB1 ON DETECTOR ASSY (6 POLES).
- TERMINAL LOCATED ON TB2 ON MECHANISM ASSY (7 POLES).

PROCESSOR MODEL	4 WIRE RECEPT.—TERM.		
	X	Y	Z
MOD. B INDUSTRIAL	2 WHITE NEUTRAL	2 YELLOW NO. 22	WIRE NO. 13 SUPPLIED



VIEWING FACE OF RECEPTACLE

KODAK INDUSTRIAL X-OMAT FILM FEEDER, MODEL 5-K (DECEMBER 1966)

X-OMAT CENTER

Radiography Markets Division

EASTMAN KODAK COMPANY • ROCHESTER, N. Y. 14650

AUTOMATIC X-RAY PROCESSING

AND

TROUBLE - SHOOTING

The advantages of automatic processing are so great that its applications became commonplace in small X-ray installations, while it is a necessity in larger medical institutions. Minor difficulties can be pinpointed very easily if some specialized technical knowledge is available. As manufacturer of chemicals we would like to cooperate with you in the area of technical assistance, therefore, we have compiled the following outline, which should be of considerable value in trouble-shooting.

Using our solutions you are assured to have top quality chemistry at your disposal.

AUTOMATIC X-RAY PHOTOGRAPHY

1951

FIGURE - 1

The advantages of automatic photography are so great that its application has become widespread in all X-ray installations. While it is a necessary in all X-ray installations, many difficulties can be pinpointed very easily if some special technical knowledge is available. As much as possible of this knowledge we would like to contribute with you in the form of technical assistance. Therefore, we have included the following outline, which should be of considerable value to X-ray operators.

Using our solutions you are assured to have top quality chemistry at your disposal.

LOW DENSITIES

1. Developer temperature too low. Increase the developer temperature to operate at just below an acceptable base fog level. Check the actual temperature with a thermometer in the solution. Check the incoming water temperature to eliminate the possibility of decreased temperature due to cold water in the heat exchange system. (Incoming water should be approximately 7 degrees below developer temperature).
2. Developer replenishing rate too low. Check the replenishing rate when the solution is low in the replenishing tank to exclude head pressure effect on the replenishing pumps. Possible kink or plugged hose, microswitch malfunction, airlock in line.
3. Developer contaminated. Considerable cloudiness. Be extremely careful in replacing fixer rack to prevent overflow into the developer tank. Plugged fixer overflow allowing fixer to back up and overflow into developer tank.
4. Recirculating pump not working.
5. Too much starter in developer processing tank. Whenever changing developer, process a step wedge before and after changing. Develop a blank film for a base fog comparison.
6. Incorrect mixing. Use: four bottles part A, two bottles part B and one bottle part C. (20 gallon size).

BASE FOG

1. Replenishing rate too high. Check rate with maximum and minimum solution in replenishing tanks to compare head pressure effects. Add starter solution to developer processor tank, instead of draining and starting again.
2. Developer temperature too high. Incoming water temperature too high, (higher than the operating developer temperature).
3. Check the film. Outdated. Possible exposure from safelight, radiation, or light source, heat. If possible hand process film to check fog.
4. Not enough starter. Add more starter and check with a blank film.
5. Light leakage in cassette.

APPENDIX

Developer temperature for low pressure...
temperature of water in the developer...
the developer...
water in the developer...
the developer...
the developer...
the developer...

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APPENDIX

The main factor in developer processing...
the developer...
the developer...
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APPENDIX

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APPENDIX

FILMS NOT TRANSPORTING

1. Slippery developer rollers. Clean developer rack.
2. Hardener omitted from fixer (films stuck in dryer).
3. Incorrect deflector adjustment. - Adjust deflector when possible. If unable to adjust, turn deflector end for end, this will sometimes help.
4. Mechanical difficulty. - Drive chain too loose. Gears and bushings worn.

FILMS NOT DRYING

1. Depleted Fixer. - Check replenishing rate with replenishing tank level at the minimum (head pressure). Drain fixer and start with new.
2. Hardener omitted in fixer.
3. Inadequate washing. - Check water drain to be sure it is completely closed. Check water circulation.
4. Clean air tubes.
5. Drying characteristics of various films.
6. Drying characteristics of various solutions.
7. Wet squeegee. - Some processors employ squeegee rollers in the washracks. If the water level is too high the rollers will become too wet.
8. Adjust damper in drying system.

SCRATCHES

1. Deflector adjustment. Minute scratches along the leading edges of the films are common, but if they are extended in a straight line deflector, adjustment is most likely the answer.
2. Drive roller dragging. Usually occurring with the one inch roller (especially in the fixer) resulting in the film being dragged along, where small particles between the roller and film will cause scratching. These scratches appear to be erratic with no definite pattern. If the rollers have been removed recently, it is possible that one of the drive rollers was replaced with the drive gear on the wrong side.
3. Incorrect solution mixing. Part B omitted from the developer. Hardener omitted from the fixer.
4. Rough feed tray. These scratches appear as smudges on the films, usually in the pattern of finger prints.

THEORY OF THE...

1. The first part of the theory is concerned with the general principles of the subject. It is divided into two main sections: the first deals with the general principles, and the second deals with the specific details of the subject. The first section is divided into two main parts: the first part deals with the general principles, and the second part deals with the specific details of the subject. The second section is divided into two main parts: the first part deals with the general principles, and the second part deals with the specific details of the subject.

THEORY OF THE...

2. The second part of the theory is concerned with the specific details of the subject. It is divided into two main sections: the first deals with the general principles, and the second deals with the specific details of the subject. The first section is divided into two main parts: the first part deals with the general principles, and the second part deals with the specific details of the subject. The second section is divided into two main parts: the first part deals with the general principles, and the second part deals with the specific details of the subject.

THEORY OF THE...

3. The third part of the theory is concerned with the specific details of the subject. It is divided into two main sections: the first deals with the general principles, and the second deals with the specific details of the subject. The first section is divided into two main parts: the first part deals with the general principles, and the second part deals with the specific details of the subject. The second section is divided into two main parts: the first part deals with the general principles, and the second part deals with the specific details of the subject.

THEORY OF THE...

4. The fourth part of the theory is concerned with the specific details of the subject. It is divided into two main sections: the first deals with the general principles, and the second deals with the specific details of the subject. The first section is divided into two main parts: the first part deals with the general principles, and the second part deals with the specific details of the subject. The second section is divided into two main parts: the first part deals with the general principles, and the second part deals with the specific details of the subject.

5. The fifth part of the theory is concerned with the specific details of the subject. It is divided into two main sections: the first deals with the general principles, and the second deals with the specific details of the subject. The first section is divided into two main parts: the first part deals with the general principles, and the second part deals with the specific details of the subject. The second section is divided into two main parts: the first part deals with the general principles, and the second part deals with the specific details of the subject.

DRYING PATTERN

1. Dryer too hot.
2. Air tubes to be cleaned.
3. Drying Characteristics of various films and solutions.

STATIC

1. Check tinsel grounding in processor.
2. Ground work bench.
3. Check clothing of darkroom personnel.
4. Employ humidifier in darkroom.
5. Check for build-up in microswitch grooves (static appears as continuous dark line).
6. Check automatic feeder. By-pass the loader and feed directly into the developer rack to eliminate the possibility of feeder static.
7. Use anti-static cleaner on cassettes.
8. Loose packaging of film.

PRECIPITATION IN FIXER

1. Incorrect mixing. Hardener mixed with solution A without diluting solution first.
2. Manual hardener mixed with automatic solutions.
3. Very "hard" water.
4. Solution concentrates frozen. Gray "slushy" precipitate in bottom of Part A of Fixer.
5. Plating in fixer processing tank. Check air gap in silver recovery unit.
6. White precipitate on fix-wash cross-over. Clean cross-over nightly.

PRELIMINARY

1. Check for...
2. All tubes to be cleaned.
3. ...

STATIC

1. Check glass mounted in processor
2. ...
3. Check cleaning of ...
4. Apply ...
5. Check for ...
6. Check ...
7. Use ...
8. ...

PRECIPITATION IN TANK

1. ...
2. Manual ...
3. Very ...
4. Solution ...
5. ...
6. ...

EMULSION COMING OFF IN DEVELOPER

1. Lack of hardener. Part B left out in mixing.
2. Exhausted Developer. This can give the appearance of tiny air bubbles or pin holes on the film. Check replenishment.
3. Check undeveloped film to see if emulsion is peeling before processing.

MILKY APPEARANCE OF FILM

1. Depleted fixer. Check replenishing rate of fixer. Check overflow of Developer to eliminate possible back-up and overflow into fixer cross partition.
2. Inadequate washing. Check water flow and wash tank drain control.
3. No water in wash tank.

EXPOSURE OF FILM IN DEVELOPER

1. Part of developer Part B left out in mixing.
2. Inverted Developer. This can give the appearance of fine holes in the film. Check for consistency.
3. Check developer film to see if emulsion is settling before processing.

FIXING APPEARANCE OF FILM

1. Replaced fixer. Check remaining level of fixer. From quantity of developer to eliminate possible error up and overline that takes cross section.
2. Inadequate washing. Check water flow and wash tank area control.
3. No water in wash tank.

STARTER

The addition of Starter is very important when installing solutions, especially in the 90 sec. system. This starter was formulated to maintain constant densities and low base fog. There will be no variations with use. The starter has an immediate effect on the densities, therefore, an excessive amount, especially in a new installation, would be undesirable (low densities). Process a stepwedge before changing solutions, change solutions and add less starter than recommended. Process another stepwedge. Comparison of the two wedges will give density indication. Identical densities can be achieved by adding small amounts of starter. The recommended 3.2 ounces of starter per gallon of tank developer is an average figure. The described procedure will eliminate any variation due to different makes of processors.

REPLENISHING RATES

DEVELOPER

Normal Cycle 60cc
Half Cycle 65cc
90 sec. 65cc (low vol.)
90 sec. 50cc (high vol.)

FIXER

Normal Cycle 75cc
Half Cycle 95cc
90 sec. 120cc (low vol.)
90 sec. 100cc (high vol.)

DEVELOPER OPERATING TEMPERATURES

NORMAL TEMPERATURE FORMULA

Normal Cycle ~~84° F~~ 82°
Half Cycle ~~88-93° F~~ 90°
90 sec. ~~98-106° F~~ 103°

LOW TEMPERATURE FORMULA

Normal Cycle ~~77° F~~ 78°
Half Cycle ~~81-86° F~~ 83°
90 sec. ~~91-99° F~~ 89°

EXHIBIT

The following is a list of the various types of...
The first type is the...
The second type is the...
The third type is the...
The fourth type is the...
The fifth type is the...
The sixth type is the...
The seventh type is the...
The eighth type is the...
The ninth type is the...
The tenth type is the...
The eleventh type is the...
The twelfth type is the...
The thirteenth type is the...
The fourteenth type is the...
The fifteenth type is the...
The sixteenth type is the...
The seventeenth type is the...
The eighteenth type is the...
The nineteenth type is the...
The twentieth type is the...
The twenty-first type is the...
The twenty-second type is the...
The twenty-third type is the...
The twenty-fourth type is the...
The twenty-fifth type is the...
The twenty-sixth type is the...
The twenty-seventh type is the...
The twenty-eighth type is the...
The twenty-ninth type is the...
The thirtieth type is the...

APPENDIX

Normal Cycle 1000
Half Cycle 500
10 sec 1000 (later 500)
50 sec 5000 (later 1000)

REVISIONS OF LATEST TEMPERATURES

TEMPERATURE FORMULA

Normal Cycle 1000
Half Cycle 500
10 sec 1000 (later 500)
50 sec 5000 (later 1000)