

Hema-Tek[®] 1000

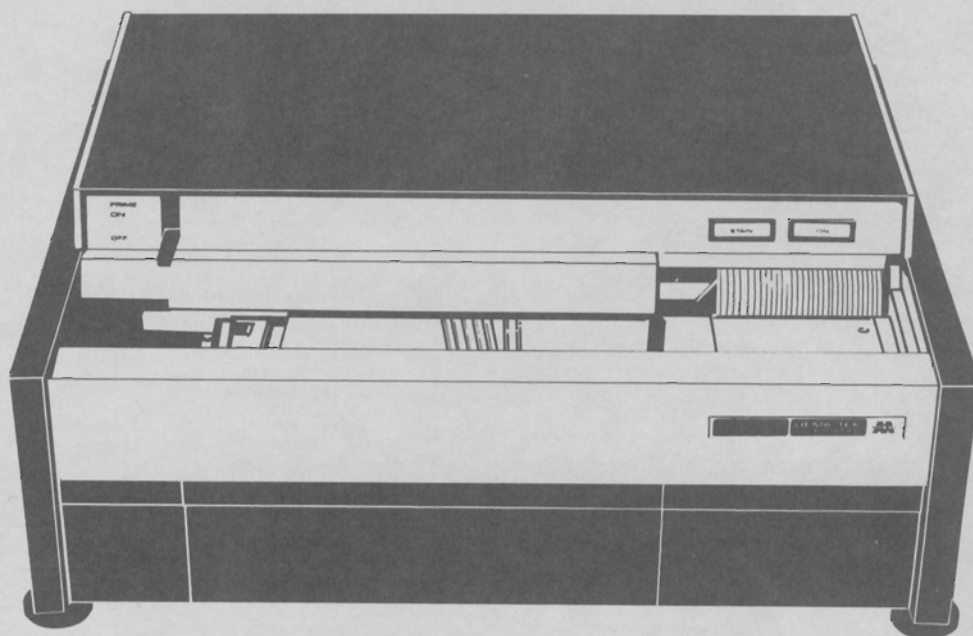
Automated Slide Stainer

Operating Manual

Model No. 4480A

Model No. 4485A

Slide Stainer



Hot Line 1-800-348-8100

OPERATING MANUAL

HEMA-TEK[®] 1000 Slide Stainer HEMA-TEK[®] Stain Pak

Model 4480A 115VAC 50/60 Hz

Model 4485A 230VAC 50/60 Hz

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SECTION 1

INTRODUCTION

DESCRIPTION

HEMA-TEK® 1000 Slide Stainer is a self-contained, electrically operated, fully automated, bench-top precision instrument, designed specifically for use in hematology. It will accept, convey, fix, stain and deliver dry blood film preparations spread on standard 25mm × 75mm or 1" × 3" glass slides. It will do this with consistency and uniform reproducibility at a rate of one slide per minute. This instrument is designed to be as near maintenance free as possible and, if given reasonable care, will require little attention.

The mechanical operation of the slide stainer is simple and unique. Two conveyor spirals (Figure 1-1) are utilized to convey separate slides face down over the platen. Three sensing switches are triggered sequentially to activate three solution pumps which meter and deliver a special stain, buffer and rinse into the capillary space intervening between the slide and platen. After staining and thorough rinsing are accomplished, the slide is dried by a flow of air from a low velocity blower and then deposited in a slide drawer.

When only enough volume of stain, buffer and rinse remains to stain approximately 20 slides, a weight-sensing device activates a switch, turning off the STAIN pilot light. This light is on continually while the slide stainer is operating and there is sufficient stain solution remaining. The light will shut off when HEMA-TEK® Stain Pak needs replacement.

HEMA-TEK Stain Pak (Figure 1-2) consists of three bottles containing a special stain, buffer and rinse. One Stain Pak provides enough solutions to fix and stain approximately 1000 blood film preparations, when the instrument is operated according to instructions (See Section 3). HEMA-TEK Stain Pak is designed to facilitate installation and removal from the well at the rear interior of the slide stainer. Best results are obtained by using this special HEMA-TEK Stain Pak with the HEMA-TEK Slide Stainer. Use of other stain packs or solutions may void the warranty.

Physical Specifications

Dimensions: 36.8 cm (14½") deep x 47 cm (18½") wide x 19 cm (7½") high.
Net mass: 17.2 kg (38 lbs net weight).

Circular Level

The circular level is a water bubble gauge which can be observed when the hinge-lid of the instrument is raised. It is located in line with the operating lever. It is used to assure that the slide stainer is in a level position. *Proper leveling is essential for optimal stain-buffer mixing.*

Levelers

Two grooved knobs or levelers (Figure 1-1) located on the bottom at each end of the front side of the instrument may be adjusted to raise or lower the instrument to a level position. The circular level will indicate when the levelers have been properly adjusted and the instrument is level.

SLIDE TRANSPORT SYSTEM

Conveyor Spirals

There are two parallel, gear-driven conveyor spirals with opposing spiral grooves (Figure 1-3). Slides to be stained are fitted separately into the opposing grooves which move them across the slide stainer. When loading blood films in the instrument, the side of the slide covered by the blood film is faced to the left of the operator. Slides are moved by the conveyor spirals side by side, from right to left, first in a vertical plane, then to a horizontal plane with the blood film facing downward toward the platen.

Platen

The platen is located between the conveyor spirals (Figure 1-3). Its edges, two parallel elevated ridges, give support and guidance to the slides as they are moved from the vertical to the horizontal plane and across the slide stainer from right to left. The platen is a precision-machined component designed specifically to maintain exact volumes of required solutions within a capillary space between it and the slide and to provide a mixing system for stain, buffer and rinse. A gutter alongside the platen allows for drainage of used solutions into the waste tank below. The platen provides the necessary space-time interval for proper drying of the slides before they are deposited in the slide drawer.

When a slide is placed vertically in the opposing grooves of the conveyor spirals at the right end of the platen, the rotation of the spirals advances it into a face down position upon the platen. The leading edge of the slide is moved into contact with the stain sensing switch finger which activates the sensing switch, starting the stain pump through a closed cam switch. The special stain located in the HEMA-TEK Stain Pak is then precisely metered and delivered through a cannula and tube network to the platen orifice. The capillary space between the undersurface of the slide and the platen is filled with the measured volume of staining solution desired.

The amount of solution pumped is mechanically adjustable through a "small volume range" by an adjustable rotor roller assembly mounted on the pump motor shaft. The pump operates until the cam switch is opened through a detent action of a rotating gear/cam assembly located at the right end of the instrument.

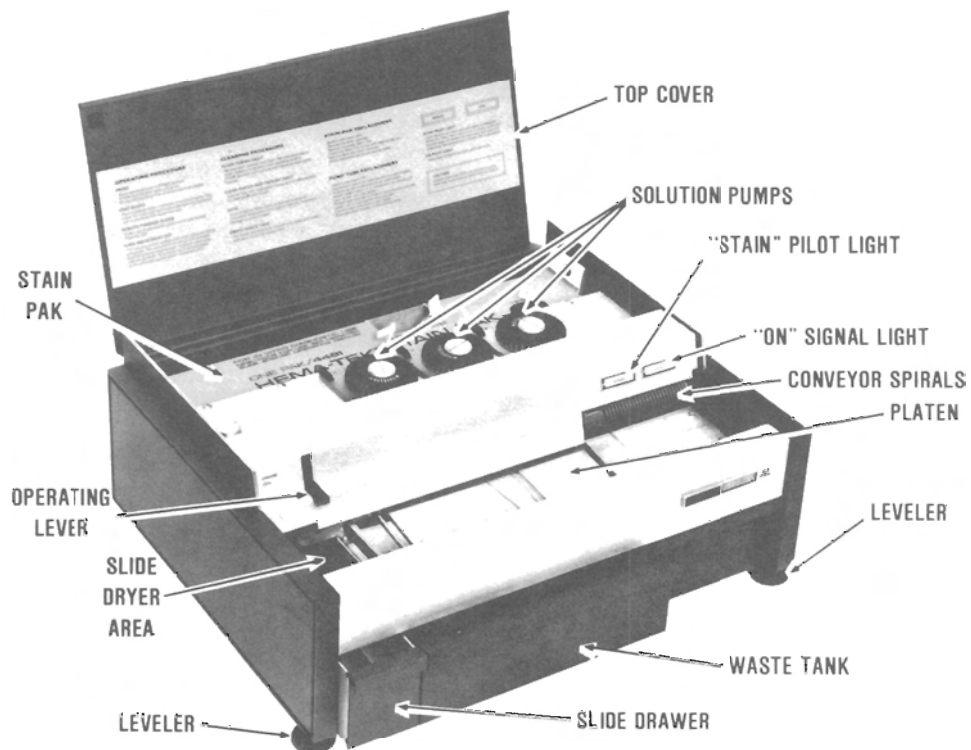


Figure 1-1
HEMA-TEK SLIDE STAINER



Figure 1-2
HEMA-TEK STAIN PAK

The slide with blood film which is in contact with the stain advances on the platen for a predetermined time to come in contact with the buffer sensing switch finger. The activation of the buffer switch starts an instrument "buffer mix cycle" in the same manner as described above for the "stain cycle." A metered amount of buffer solution is delivered to produce at least a 1:2 stain/buffer dilution. Application of the buffer to the stain produces the desired cellular differentiation that is characteristic of a Romanowsky-type stain. Angled baffle grooves in this portion of the platen thoroughly mix the buffer solution with the stain.

Finally after a predetermined time the Stain-Buffer mix is allowed to drain off as a "rinse cycle" is initiated through slide contact with rinse sensing switch finger. Adequate rinse solution is delivered to the slide to completely remove excess stain and buffer through an orifice located on a transverse ridge of the platen. The capillarity of the rinse solution provides contact with the undersurface of the slide until the blood film is completely rinsed. The slide is then dried by a stream of air and deposited in the slide drawer, which has a capacity of 100 slides.

A sloping channel in the platen carries used reagent solutions to the waste tank or drain.

It is important that the platen be cleaned after each usage. Detailed methods for daily and periodic cleaning can be found in Sections 5 and 6 of this manual.

Conveyor Drive Motor

This synchronous motor is located inside the instrument on the right side behind the cam switches. It drives both the conveyor spirals and the gear assembly, thereby providing accurate timing for the solution pump motors.

Slide Drawer

The slide drawer is located below and at the left end of the platen (Figure 1-1). It receives the slides as they drop from the platen after being stained, rinsed and dried. The drawer will hold 100 slides.

Slide Drying System

The dryer is located within the instrument, behind the right side panel. It is a blower type fan which runs continuously when the instrument is in operation. The air flow serves to cool the conveyor drive motor and solution pump motors as well as to dry the slides.

STAINING SYSTEM

Volume Controls

Three grooved control knobs are accessible when the lid of the instrument is raised (Figure 1-4). They are lined up side by side in front of the well containing HEMA-TEK Stain Pak. The volume of solution being delivered can be adjusted (i. e., increased or decreased) by rotating the respective control knob clockwise (toward +) or counterclockwise (toward -). The flow of stain and buffer can be regulated by careful adjustment so that solutions will just fill the capillary space between platen and slide without wasteful overflow.

Solution Pumps

The three pump units are equipped with synchronous motors and are located inside the instrument in front of HEMA-TEK Stain Pak well (Figure 1-4). Their purpose is to maintain a constant metering speed and provide the proper volume of stain, buffer and rinse even though line voltage may fluctuate.

Pump Tube Sets and Cannulas

Pump tube sets contain three separate pieces of tubing that are numerically coded to facilitate identification. The stain tube is coded (1), the buffer tube is coded (2), and the rinse tube is coded (3). Each tube has a clear plastic cuff surrounding its circumference. These cuffs fit snugly up to the pump arms and hold the tubes in position without slippage. The tubing is a special type of plastic, selected to resist leaching and brittleness. The special diameters and lengths of the tubing assure precise measurement of solutions. No substitution of tubing should ever be made. Use only HEMA-TEK Pump Tube Sets with HEMA-TEK Slide Stainer. Other tubing will result in mismeasurement and improper staining, buffering and rinsing. Three cannulas are provided with HEMA-TEK Slide Stainer and can be used indefinitely (Figure 2-1).

Sensing Switches

There are three finger-like sensing devices located just above the platen. The edge of the advancing slide contacts them sequentially, and activates the sensing switches and motor driven cam assemblies. The solution pumps are timed by the cams so that precise volumes of stain, buffer and rinse are delivered to their respective areas on the platen in sequence.

Waste Tank

The waste tank (Figure 1-1) is located underneath the platen and collects used and overflow stain solutions. To avoid spillage of the contents while emptying the waste tank, carefully pull waste tank away from instrument and support the bottom of the waste tank to hold it level during removal from the instrument.

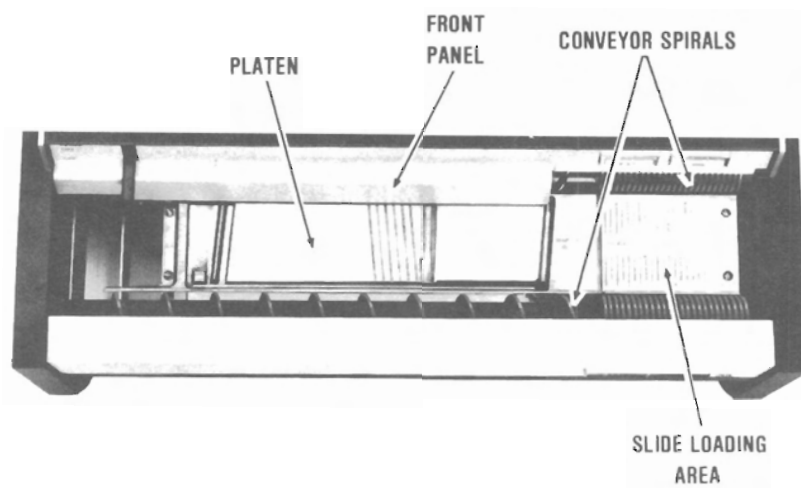


Figure 1-3
CONVEYOR SPIRALS AND PLATEN

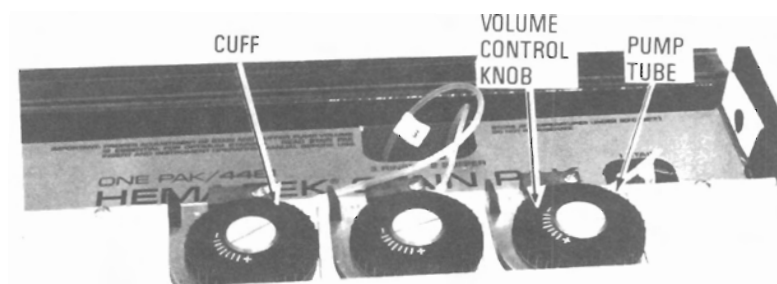


Figure 1-4
SOLUTION PUMPS—SHOWING VOLUME
CONTROL KNOBS AND PUMP TUBING

ELECTRICAL SYSTEM

Operating Lever

This is a multiple function switch located at the front left side of the instrument, near the top (Figure 1-5). It is a bar shaped lever with a flat surface for easy finger manipulation. The three positions of the lever are labeled and their related functions are as follows:

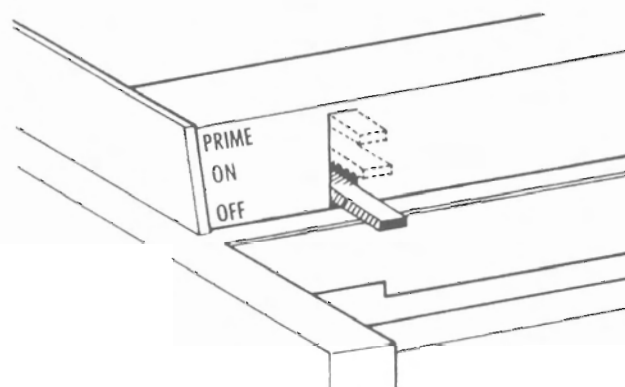


Figure 1-5

THREE OPERATING LEVER POSITIONS

1. "OFF" electrically disconnects the instrument.
2. "ON" is the position for starting the instrument.
3. "PRIME" provides an override control to allow the pumps to run continuously so that the tubes are primed with solutions and cleared of air bubbles. The metered stain solution then flows into the capillary space between the platen and slides. After priming, the lever is released and returns to the "ON" position by itself.

Stain Pilot Light

The stain pilot light is located at the right side of the instrument near the top (Figure 1-1). It is on when HEMA-TEK Slide Stainer is functioning properly. When the Stain Pak is reduced to a reserve sufficient to stain only about 20 slides, a weight-sensing device cuts the circuit and the light goes off. The Stain Pak should be replaced at this time.

"ON" Signal Light

The "ON" signal light is to the right of the stain pilot light (Figure 1-1). When the operating lever is moved to the "ON" or "PRIME" position, the light goes on.

Front Panel Interlock Switch

HEMA-TEK Slide Stainer is equipped with a Front Panel Interlock Switch (Figure 6-1). Removal of the Front Panel deactivates this switch, shutting off electrical power to the instrument motors and sensing switches. This switch provides a safety feature when the Front Panel is removed. The Front Panel must be properly positioned and secured to reactivate this switch.

Plug and Line Cord

This is a standard, grounded 3-prong plug attached to a heavy duty line cord which extends from the bottom, rear, right end of the instrument.

Fuse

A fuse (2 amp, Type 3AG) is provided to protect the instrument and laboratory power supply in event of a breakdown or defect in the electrical system. The fuse holder is located behind the panel on the right side of the instrument.

Safety Standards

HEMA-TEK Slide Stainer meets all N.F.P.A. (National Fire Protection Association) safety standards and Occupational Safety and Health Act standards as set forth in the Department of Labor FEDERAL REGISTER, Volume 36, Number 105, Part II, dated Saturday, May 29, 1971.

HEMA-TEK Slide Stainer Model No. 4480 (115 V/60Hz) is listed by the Canadian Standards Association as certified.

SECTION 2

INSTALLATION

GENERAL

After HEMA-TEK® Slide Stainer is unpacked, it must be installed on a firm surface in the designated work area. Locate the instrument in a well ventilated area, avoiding exposure to corrosive vapors or temperature extremes and near a power source which meets the electrical requirements (voltage) specified on the rating label located on the rear of the instrument.

Complete the following steps to insure proper installation and performance of your HEMA-TEK Slide Stainer.

INSTALLING HEMA-TEK SLIDE STAINER

- STEP 1 LEVEL INSTRUMENT**
Lift the hinged lid of instrument. Adjust each leveler until the circular level gauge shows the instrument to be level and securely stationed.
- STEP 2 PLUG LINE CORD INTO GROUNDED OUTLET**
The line cord of HEMA-TEK Slide Stainer uses the standard 3-prong plug. The rounded prong carries the instrument ground wire. If the plug is accidentally pulled or there is a power failure during operation, it may be necessary to remove slides on platen and reprocess them.
- NOTE:** Be sure that outlet supplies the proper voltage (110 volt 60 cycle AC; 220 volt 50 cycle AC). Refer to rating label located on rear of instrument to determine proper voltage rating.
- STEP 3 PERFORMANCE CHECK (PRIOR TO INSTALLING HEMA-TEK STAIN PAK)**
- Lift the operating lever (Figure 1-5) to the "ON" position. The "ON" signal light will light up and the conveyor spirals will revolve.
 - Inspect the slide dryer area (Figure 1-1) for noticeable air flow.

- Place five blank slides into the grooves of the conveyor spirals. Allow the slides to automatically feed onto the platen. As the slides move down the platen, right to left, observe that the leading edge of the slides contact and activate all three sensing switches which are located behind the front panel with their activating wires exposed in the platen trough. (Refer to Figures 1-3 and 8-9.)
- Having completed the above steps, turn the instrument "OFF" and unplug the line cord.

STEP 4 INSTALLING HEMA-TEK STAIN PAK

- Remove the three cannulas and pump tube set from their cartons (see Figure 8-3). Identify each pump tube — 3, 2 and 1 — rinse, buffer and stain.
- The identified end of each pump tube attaches to a cannula.

Refer to Figures 8-4, 8-5 and 8-6 for the following steps:

- Extend each new tube to its respective pump and thread end into hole in the pump arm at point "E." Push thumb tab to the extreme left and push tube through until plastic cuff is flush against pump arm, as shown at point "F." Release pump arm.

NOTE: If difficulty is encountered in threading tube through the pump housing, turn instrument "ON" and lift operating lever to "PRIME" for just a few seconds. This will cause the rollers inside the pump housing to rotate slightly and relieve the interference.

- Connect each tube to its proper recessed nipple, at point "A."

NOTE: If difficulty is encountered in connecting tube to its nipple, use ordinary tweezers to grasp and attach tube. (See Figure 8-6.)



Figure 2-1
INSERTING CANNULAS IN STAIN PAK

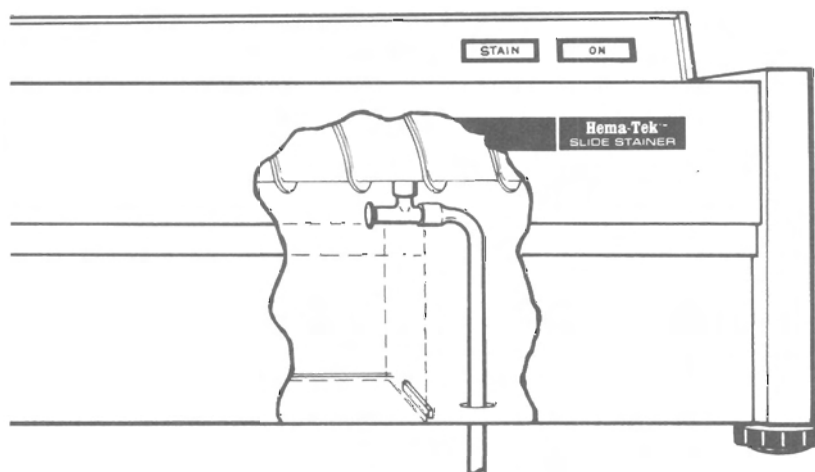


Figure 2-2
DRAIN SPOUT, PLUG AND
DRAIN TUBE

- E. Remove two perforated tabs on Stain Pak carton and insert carton, with label facing you, into well at rear of instrument. Make sure carton is all the way down and resting on the tray at the bottom of well.

Refer to Figure 2-1 for the following step:

- F. Insert each cannula in its respective bottle by puncturing centers of the inverted cones on bottles. Push cannulas down until the guard at top just touches the plastic container.

STEP 5 **WASTE TANK AND SLIDE DRAWER**
Inspect the waste tank and slide drawer for proper positioning in the instrument below the platen. The instrument is now ready to stain blood films. Continue on to Section 3, Operating Procedures.

INSTALLING OUTSIDE DRAIN

The waste tank receives used and overflow stain solutions draining from the platen. On delivery, plug will be installed in right end of drain spout so drainage is into the waste tank. However, where the instrument can be located close to a sink or drain, it will be convenient to bypass the used solutions to this outside disposal point — particularly when continuous drainage is desired. Install the necessary outside drain tube as follows:

- STEP 1** Pull out waste tank from front of instrument.
- STEP 2** Reach up to the T-shaped drain spout located on the bottom of the platen and remove the yellow drip plug from the left side of the drain spout (Figure 2-2). Save this plug in case the internal drain may be used in the future.
- STEP 3** Remove the yellow plug from the right side of the drain spout and push it into the left side of the spout.
- STEP 4** Attach drain tube (5/16" I.D.) to right end of drain spout and pass tube through hole in bottom of instrument and over to sink or drain.
- STEP 5** Reinstall waste tank in instrument.

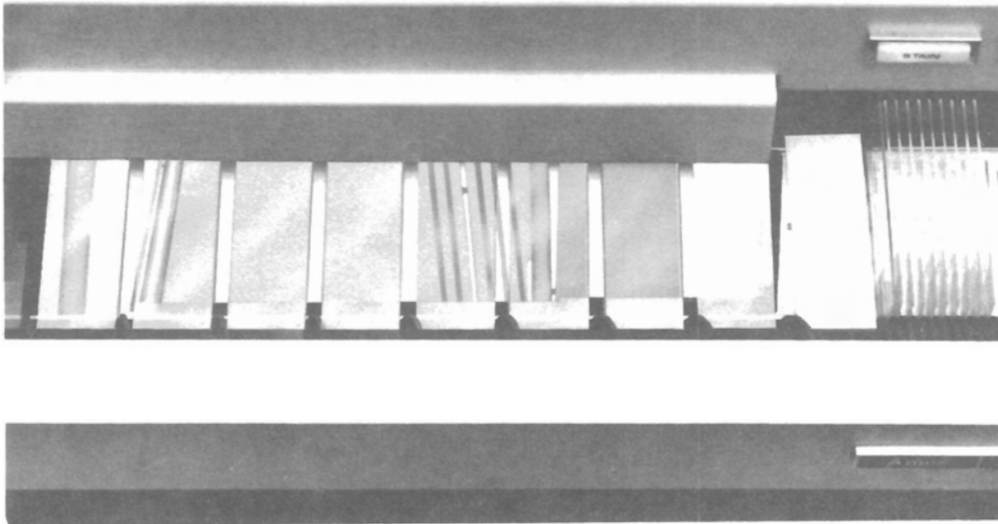


Figure 3-1

SLIDES LOADED AND IN PROCESS



Figure 3-2

INSERTING STAIN PAK IN WELL

SECTION 3

OPERATION

GENERAL

- Use high quality slides. Do not use imperfect slides.
- If the instrument is not to be used for 1 hour or more, it is suggested that it be turned off. The instrument must be primed when it is again started.
- Cover instrument for protection from dust when not in use.

CAUTION: Use HEMA-TEK® Stain Pak only. Other solutions may contain undissolved or particulate materials.

OPERATING PROCEDURES

STEP 1 STARTING INSTRUMENT

Lift operating lever to top position "PRIME" and release. The stain pilot light will light up if the Stain Pak is not depleted. The instrument "ON" signal light will go on and the conveyor spirals will begin to revolve.

NOTE: When the Stain Pak is reduced to a reserve sufficient to stain about 20 slides the stain pilot light goes "OFF" to indicate replacement of Stain Pak is necessary. Refer to procedure in this section.

STEP 2 PRIMING

Lift operating lever to top position "PRIME" and hold in this position until the stain, buffer and rinse solutions flow evenly through their tubes without any air bubbles. Release lever, which returns automatically to the "ON" position.

NOTE: When solutions (stain, buffer, rinse) flow onto platen, wipe the solutions off platen with soft lint-free absorbent cloth or tissue.

STEP 3 LOADING BLOOD FILM SLIDES

Place prepared slides with blood films for staining in grooves of conveyor spirals. The side with the blood film must face to the left of the operator. Place the slide so that the feathered edge of the blood film is toward the back of the instrument. (See Figure 3-1.)

NOTE: Slides must be inserted into the spiral grooves so that they are parallel to the slide loading lines inscribed on the platen. If slides are not placed correctly in the spiral grooves, breakage may occur.

STEP 4 AUTOMATIC STAINING

The slides will now be conveyed along the platen, first vertically and then horizontally, with the blood film side down. When the slide contacts the first sensing switch the stain will flow from the stain spout, filling the capillary space between platen and slide, flooding the blood film surface. The metered volume of stain will be followed by metered volumes of buffer and rinse solutions as the slide moves through the next two sensing switches. After rinsing, the slide is dried by warm air circulated by a dryer fan that runs continuously while the instrument is operating. After drying, the slides are gently delivered into the slide drawer (capacity 100) and are ready for examination by the microscopist.

NOTE: If solutions overflow rather than fill the capillary space between platen and slide, or improper staining results, the solution pumps need adjustment. See Pump Volume Adjustment, page 3.3.

STEP 5 TURN INSTRUMENT "OFF" WHEN NOT IN USE

The drive motor of HEMA-TEK Slide Stainer runs continuously when the instrument is turned on. The solution pumps operate only when slides are being processed. The instrument may be left "ON" between batches without wasting stain; however, repriming may be necessary. If no slides are to be processed for an extended period — one hour or more — it is suggested the instrument be turned off. Repriming will then be necessary.

IMPORTANT: Always clean instrument after daily use. See Daily Maintenance, Section 5.

STAIN PAK REPLACEMENT

When the stain pilot light does not light up upon starting instrument — or goes off when instrument is operating — a new HEMA-TEK Stain Pak is needed:

STEP 1 Switch instrument off. Remove the three canulas and lift empty Stain Pak carton out of well at rear of instrument.

STEP 2 Insert new Stain Pak carton in well, with label facing you (Figure 3-2). Make sure it is all the way down and resting on tray at bottom of well.

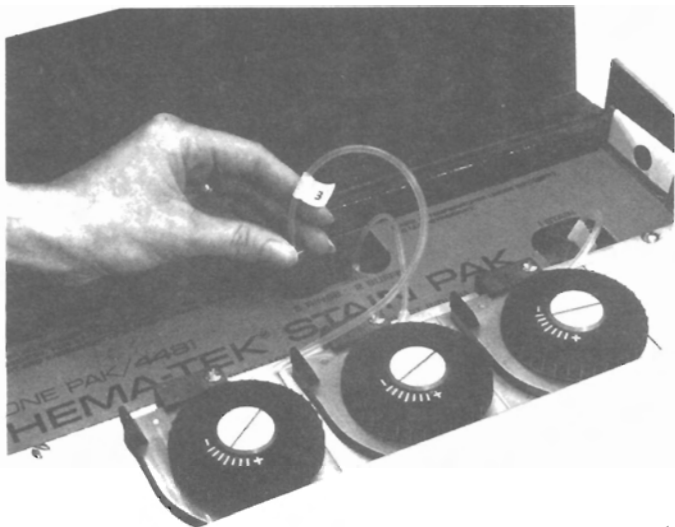


Figure 3-3
INSERTING CANNULAS IN STAIN PAK



Figure 3-4
ADJUSTING VOLUME CONTROL
OF SOLUTION PUMP

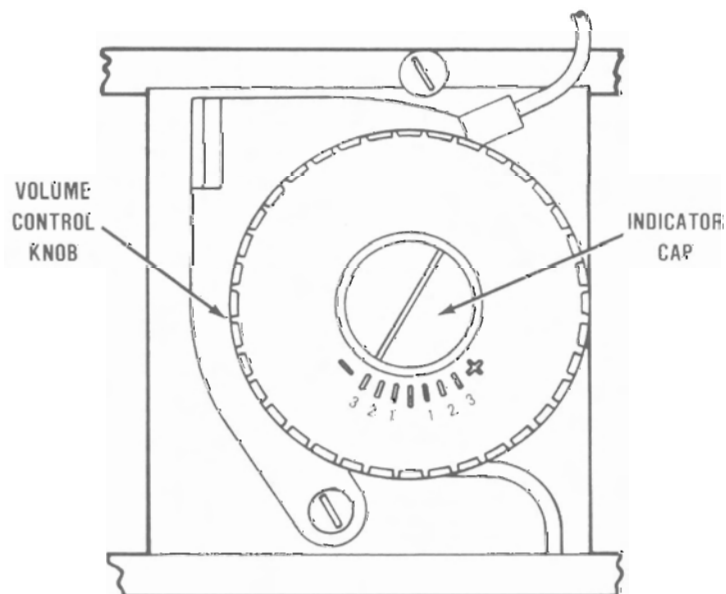


Figure 3-5
VOLUME CONTROL KNOB

STEP 3 Remove two perforated tabs on new Stain Pak carton. Insert each cannula in its respective bottle by puncturing centers of the inverted cones on bottles (Figure 3-3). Push cannulas down until the guard at top just touches the plastic container.

STEP 4 Empty waste tank and rinse with water after each Stain Pak replacement.

NOTE: After Stain Pak replacement, instrument must always be primed to remove any air bubbles in solution pump tubes picked up during the changeover. (Refer to Section 8 for adjustment of "STAIN" Pilot Light Switch.)

PUMP VOLUME ADJUSTMENT

HEMA-TEK Slide Stainer has been designed to continuously produce stained slides of high quality. This is accomplished by having a fixed length of time in the stain phase, a fixed length of time and a stain/buffer volume ratio mix in the buffer solution phase, and a fixed length of time in the rinse phase. Desired staining results will be assured if the pump volumes are correct since the time phases are constant. A small change in the stain/buffer ratio can result in either lighter staining or darker staining.

A stain/buffer ratio of not less than 1 part stain to 2 parts buffer (i. e., 1:2 stain/buffer) has been found to provide the proper ratio needed for optimum staining performance. In addition, the rinse solution volume should be approximately 1 ml/slide.

NOTE: In some instruments, a stain to buffer ratio of 1:2.5 or even 1:3 may be needed to achieve desired staining results.

To assure desired staining results, the amount of solution pumped in each phase is adjustable through a "small volume range." Control knobs for this purpose are located under the instrument cover (see Figure 3-4). The following maintenance procedures and instrument checks must be completed before performing STEP 7, Adjusting Stain and Buffer Volumes:

STEP 1 TUBING REPLACEMENT

Replace both sets of tubing (i.e., pump tubing and under platen tubing). See Section 8, Part D.

NOTE: It is a good policy to replace the pump tubing after three Stain Paks have been used as tubing may lose its elasticity and alter the volume of solution pumped. The under platen tubing should be changed after ten Stain Paks have been used.

STEP 2 CLEANING THE PLATEN

For best staining results and optimum drainage of solutions, the instrument must be properly cleaned and leveled. A clean platen is vitally important in maintaining high quality results.

Platen cleaning is required at regular intervals. It is recommended that the platen be cleaned after each use. The recommended procedures for cleaning the platen can be found in Section 5, Daily Maintenance and Section 6, Periodic Maintenance.

STEP 3 LEVELING THE INSTRUMENT

HEMA-TEK Slide Stainer should be level to help provide optimal buffer mixing. Perform the following procedures:

A. Lift the hinged lid of the instrument and locate the circular level gauge located on the left of the instrument directly behind the operating lever.

B. Adjust the two leveling legs located on the bottom of each end of the front side of the instrument to raise or lower the instrument to a level position. The circular level will indicate when the levelers have been properly adjusted and the instrument is level.

NOTE: Make a final leveling check and adjustment, if needed, by watching waste fluid flow during staining. Fluids should flow evenly to the front waste trough and to the right (i.e., to the drain hole).

STEP 4 MIXING GROOVE CLEANING

Clean all accumulated residue from each mixing groove in the platen by swabbing each groove with a cotton swab soaked in methanol.

STEP 5 VENTING THE STAIN PAK

HEMA-TEK Stain Pak should be vented. Insert the cannula into the Stain Pak indentation, remove the cannula and make another insertion $\frac{1}{4}$ " from the original. If additional venting is desired, a 20 gauge needle can be placed into the stain bottle, or a larger hole can be punched into the top of the bottle.

STEP 6 CHECKING ADJUSTMENT OF SENSING SWITCH FINGERS

CAUTION: Careless cleaning practices may force the sensing switch fingers out of adjustment.

To perform this procedure, see Section 8, Part G, Adjustment of Sensing Switch Fingers.

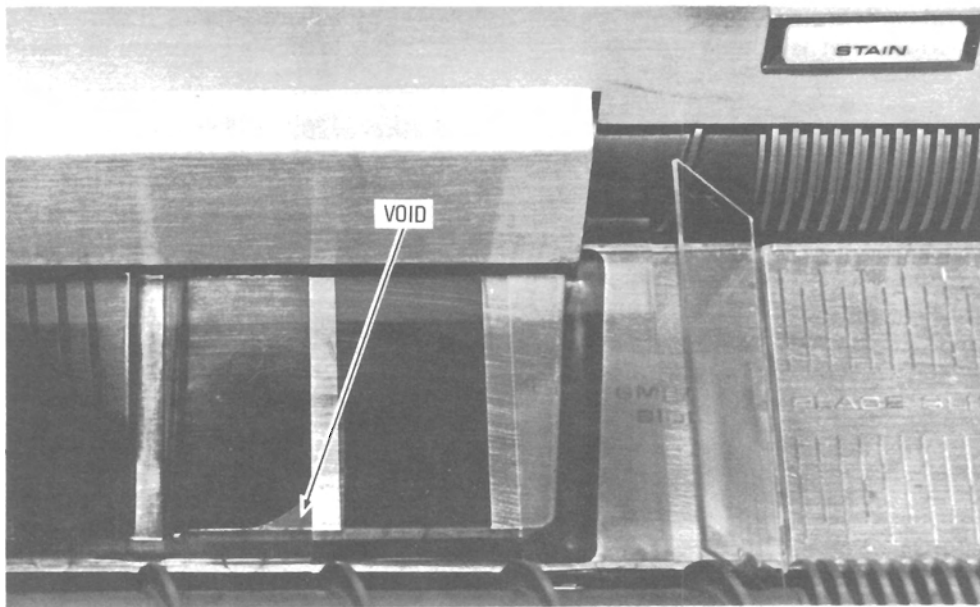


Figure 3-6
PROPER FILL WITH ACCEPTABLE VOID

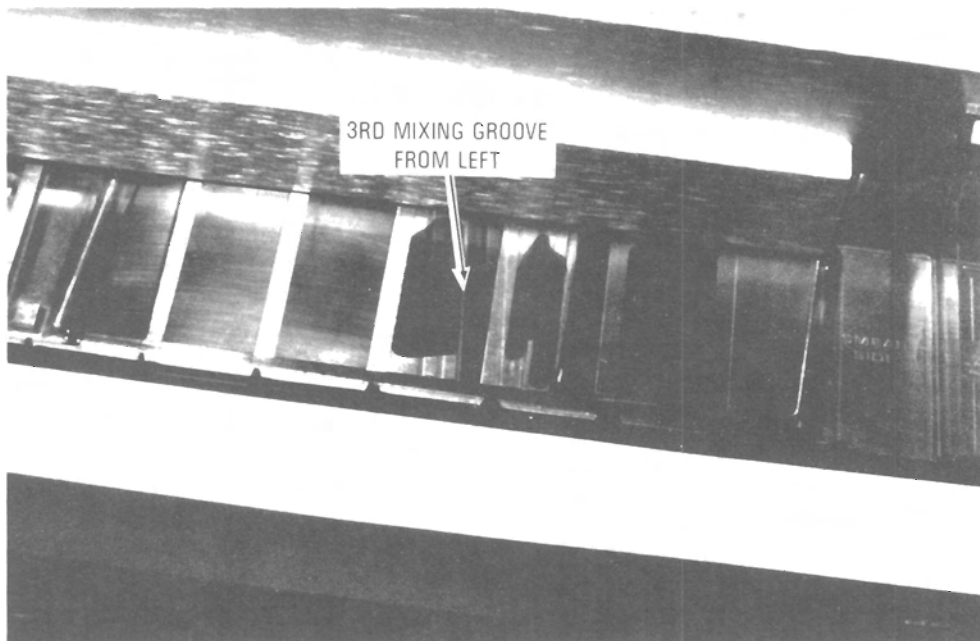


Figure 3-7
PROPER MIXING ACTION

STEP 7 ADJUSTING STAIN AND BUFFER VOLUMES

Method 1

- A. With electrical power applied to the instrument, adjust the stain and buffer volume control knobs through their range: fully counterclockwise to fully clockwise. The movement must be smooth with no binding.
- B. Align the index mark on the indicator cap with the most negative scale marker (i.e., -3) on the stain and buffer volume control knobs (see Figure 3-5) by rotating each volume control knob counterclockwise.

NOTE: The silver indicator cap located in the center of each black volume control knob provides a reference indication index for control knob adjustment. The screwdriver type slot (blue) in the cap serves only as a reference index and is *not* an adjustment.

In its proper position, when turned counterclockwise, the control knob should come to a full stop with the reference index mark on the indicator cap aligned with the most negative scale marker. If this does not occur, the indicator cap is out-of-alignment. Simply lift the indicator cap off of the control knob and replace it in the proper position.

As a final alignment check, turn the control knob clockwise until "full stop" occurs. The reference index mark on the indicator cap should now align with the most positive mark (i.e., +3) (see Figure 3-5). If not, service of the pump is indicated, and the authorized distributor service representative should be contacted.

- C. Make sure the instrument is well primed by placing the operating lever in the "PRIME" position and holding it there until solution is being pumped at all three stations (i.e., stain, buffer and rinse).
- D. To achieve proper surface tension across the platen, run five (5) blood film slides—stained or unstained—over the platen. This procedure "wets" the platen and achieves proper surface tension characteristics.

- E. Adjust the stain control knob. Run five blood film slides on platen and adjust the stain control knob so that the pump just fills, *but does not overflow*, the capillary space between the platen and slide. If the slide is receiving an inadequate amount of stain, adjust the control knob toward the positive (+) scale markers. There should be no visible overflow of solution on either side of the slide and *there should not be an excess* of stain hanging over the front, beveled edge of the platen. Small voids which may occur on the slide after proper filling are acceptable, and will not adversely affect stain quality (see Figure 3-6).

NOTE: Do not try to compensate for small voids by increasing stain volume. Increasing stain volume will upset the minimum 1:2 stain/buffer ratio and may reduce stain intensity.

As soon as a proper fill has been obtained on five consecutive slides, move on to step F.

- F. Adjust the buffer control knob. When a slide passes the buffer section of the platen, mixing of the stain and buffer occurs because of the series of mixing grooves. This is where the proper stain to buffer ratio is most important. The slides will appear underfilled as they travel over the mixing grooves because some of the solution will "fall" into the grooves. The third mixing groove from the left is deeper than the others, and should appear almost dry, in comparison to the other grooves, as a slide passes this position. As a matter of reference, this third mixing groove from left should never appear more than one-quarter full at any time, and should also appear dry between slides (Figure 3-7). Flooding of this groove may indicate an excessive volume of stain or buffer.

Because of these mixing grooves, the proper stain/buffer fill (i.e., ratio) cannot be determined until the slide passes completely over the grooves and onto the smooth portion of the buffer zone of the platen.

The buffer control knob should be set so that the buffer/stain solution just fills the capillary space under the slide and the solution does not extend out from either side of the slide.

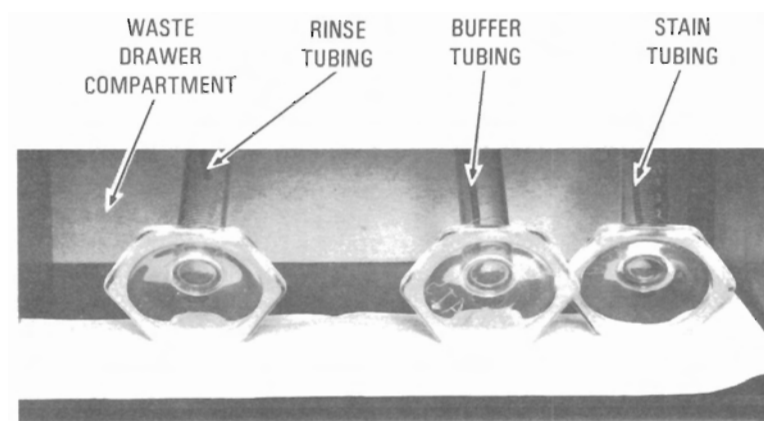


Figure 3-8
SET-UP FOR DETERMINING HEMA-TEK
STAIN, BUFFER AND RINSE VOLUMES

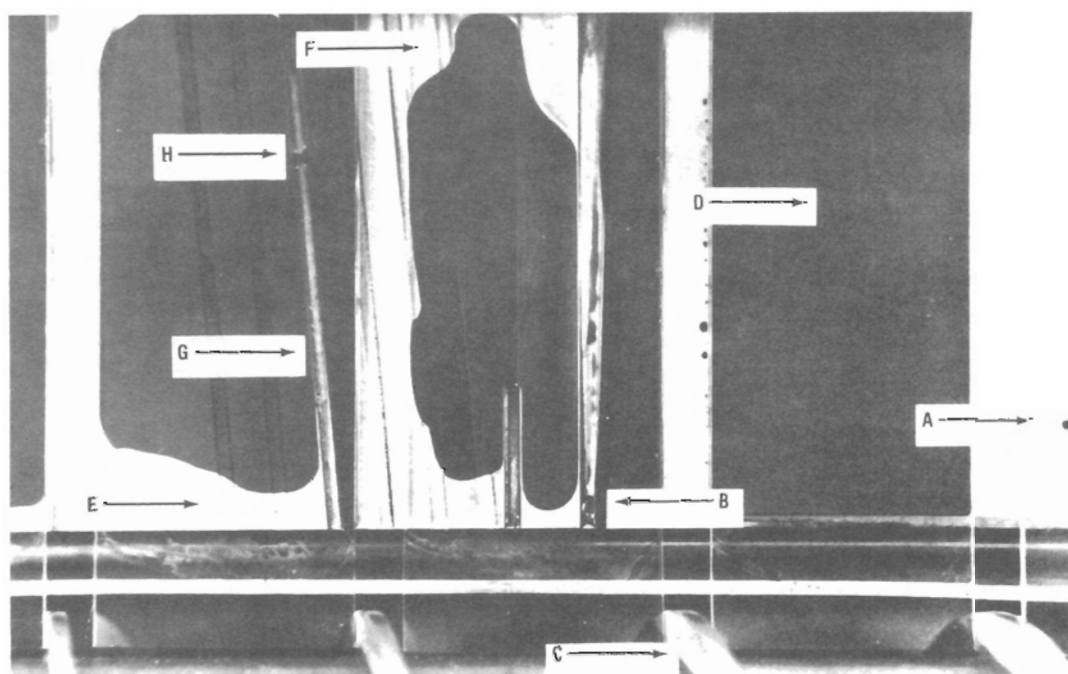


Figure 3-9
PROPERLY ADJUSTED HEMA-TEK® SLIDE STAINER

← Direction of Slide Movement

- | | |
|--|--|
| A. STAIN ORIFICE | E. MIXING GROOVES |
| B. BUFFER ORIFICE | F. SLIDE TEMPORARILY APPEARS UNDERFILLED |
| C. CONVEYOR SPIRAL | G. "DEEP" MIXING GROOVE (3rd GROOVE FROM LEFT) |
| D. SLIDE PROPERLY FILLED WITH STAIN SOLUTION | H. SMALL STREAM OF STAIN/BUFFER MIXTURE |

NOTE: Proper buffer solution volume can be determined by a solution "pulsing" action (mixing) near the front edge of platen as the stain solution bridges the first deep groove (orifice groove). A stain/buffer mixing action occurs as the slide moves along forcing the stain solution to "pulse" across the first deep groove, mixing with the buffer solution. The second deep groove, only one-third the platen width, forces the combined solutions to flow out around providing further mixing (see Figure 3-1).

Very little solution should flow into the third (from left) deep groove and it should never appear more than one-quarter full. The solutions will instead bridge the groove in a "pulsing" action as described above for the first deep groove. Unlike the first groove, this action may occur at any point along the groove.

G. Adjust the rinse control knob. A negative three (-3) setting on the rinse control knob is recommended to provide optimum rinsing (see Figure 3-5). This should provide approximately 1 ml/slide. Do not overwash.

H. Run three blood films to insure that the capillary spaces between the slide and the platen fill completely with stain, buffer and rinse. If the spaces do not fill completely, perform Steps E, F and G over again. If spaces fill completely and do not overflow, proceed to Step I below.

NOTE: Small voids which may occur in some areas on some slides as they move across the platen are acceptable, and do not constitute an underfill (see Figure 3-6). It is important that the capillary space just fills, and does not overflow when the pump shuts off.

I. Final Volume Check.

At this time, the instrument should be properly primed and adjusted and is ready for use. However, if you feel that a proper fill of stain or buffer is not being achieved, or that unsatisfactory staining is occurring, the stain/buffer ratio can be adjusted to give a minimum of a 1:2 stain/buffer ratio as follows:

1. Remove the waste drawer and disconnect the under platen tubing leading to the stain, buffer and rinse platen connections. Place this tubing into the waste drawer, and prime by using the operating lever.

2. As soon as all three pump tubings have been primed, and are free of air, place the free end of each tube into a 10 ml graduated cylinder.

NOTE: A paper towel placed along the bottom of the waste drawer compartment will prevent the graduated cylinders from slipping.

3. Process ten (10) blank slides and record the volume of stain, buffer and rinse solution pumped into each cylinder. The following should be noted:

- a. The stain/buffer ratio should be at least a 1:2 ratio (i.e., the volume of buffer should be at least twice that of stain.

- b. **EXAMPLES:** 4.0 ml buffer per
10 slides = 0.4 ml/slide
2.0 ml stain per
10 slides = 0.2 ml/slide

i.e., 1:2 ratio between stain and buffer.

- c. The rinse solution volume should be approximately 1 ml/slide (i.e., 10.0 ml/10 slides = 1 ml/slide). Adjust rinse pump (the one on the left) to deliver approximately 1 ml/slide.

4. If the Slide Stainer does not give the recommended minimum 1:2 stain/buffer ratio, adjust the buffer pump (the one in the middle) to deliver at least twice the volume of the stain pump.

WARNING: Unless the stain pump is overfilling or underfilling the capillary space under a slide, do not readjust.

NOTE: On some instruments, a stain/buffer ratio of 1:2.5 or even 1:3 may be necessary to achieve satisfactory staining.

5. Repeat steps 2, 3 and 4 above until the proper stain/buffer ratio is achieved.
6. If the stain pump cannot be adequately adjusted to achieve at least a 1:2 stain/buffer ratio, it may be necessary to call your authorized distributor service representative. The stain cam on the right side panel of the HEMA-TEK Slide Stainer may need adjusting to give a larger workable range for the stain pump.
7. As a final check of the above procedure, process several blood film slides through HEMA-TEK Slide Stainer and carefully observe it for proper performance.

ADJUSTING STAIN AND BUFFER VOLUMES

Method 2

Optimum staining is achieved when HEMA-TEK Slide Stainer is properly adjusted. Normally, proper adjustment of the instrument can be accomplished by observation of the amount of stain and buffer required to fill the capillary gap between the slide and surface of the platen. If the proper amounts of stain and buffer are being pumped, proper mixing of solutions will occur resulting in uniform staining of blood slides. Proper adjustment can be achieved by the following procedure:

- A. Replace tubing. Both the pump tube set (4482) and the Under Platen Tubing (4484) should be replaced periodically. The pump tubing should be replaced every three Stain Paks and the Under Platen Tubing every ten Stain Paks.
- B. Clean the platen, including the back trough, by flooding the platen with methanol and wiping only from *right to left* (the direction in which the slides travel) with an absorbent tissue (See Section 5, Maintenance). *Care should be taken not to damage slide sensing switches.* Some stain color may form on the platen surface which cannot be completely removed with methanol washing. This will not affect the slide staining performance. *Never use abrasive cleaners on platen.*
- C. Prime the instrument.
- D. Turn stain, buffer and rinse pump knobs (the large black wheels) fully counter-clockwise. The index mark should align with the adjustment line nearest the minus (-) marker. If not, lift off the silver cap with the line across it and replace it so that the line points to the mark nearest the minus (-) marker.

- E. Place ten (10) blank glass slides onto the conveyor spirals. Allow several slides to pass across the platen to adequately wet its surface.
- F. As the remaining slides pass across the stain area of the platen, adjust the stain pump (the pump on the right) to deliver just enough stain to fill the capillary gap between the slide and platen as the slide nears the buffer area. It may be necessary to slightly underfill or overfill the slide initially in order to provide a proper fill just prior to buffering (see Figure 3-9, D). Check that a proper fill has been obtained on at least three consecutive slides. Be aware that not all slides are perfectly flat and some variations in filling may be seen.

- G. As the slides move to the buffer area on the platen, adjust the buffer pump (the one in the center) by turning the black control knob clockwise. Adjustment should be made such that the "deep" mixing groove (the third mixing groove from the left) remains almost empty as the slide moves across it (see Figure 3-9, G). Only a small stream (about 1/4 inch or less) of stain/ buffer mixture should fill the groove (see Figure 3-9, H). The solution may even be observed to "pulse" across the groove at times. This provides maximum mixing of stain and buffer solutions resulting in more uniform and consistent staining of blood films.

NOTE: The slides will appear underfilled as they travel over the mixing grooves because some of the solution will "fall" into the grooves (see Figure 3-9, F).

- H. The rinse volume control (left pump) should be adjusted to about mid-range to provide adequate rinsing. This setting is not critical to staining performance, but it provides efficient use of the rinse solution in the Stain Pak.

Section 4

ACCESSORIES AND GENERAL INFORMATION

ACCESSORIES

To obtain best results with HEMA-TEK® Slide Stainer, HEMA-TEK Accessories should be used (Figure 4-1). HEMA-TEK® Stain Pak (4481) contains a polychrome methylene blue stain and specially prepared buffer and rinse solutions. The quantities are sufficient to stain approximately 1000 blood films.

The HEMA-TEK Cannula Set (4483), HEMA-TEK Pump Tube Set (4482) and Under Platen Tubing (4484) are available for periodic replacement. Accessory items must be ordered through authorized distributors.

SPECIMEN PREPARATION

Types of Specimens

HEMA-TEK® Slide Stainer is designed specifically for the automatic staining of blood film preparations on standard 25mm × 75mm or 1" × 3" slides. Blood films stained according to instructions (see Section 3) will provide the examiner with high quality differential staining characteristics for all cytologic blood components. Ames Division has developed a modification of polychrome methylene blue stain, contained in a unitized HEMA-TEK Stain Pak that fits easily into the well inside HEMA-TEK Slide Stainer.

Blood Film

It is of fundamental importance to start out with a properly prepared blood film. The following suggestions are recommended:

1. All materials which touch the patient for obtaining a blood specimen should be sterile. Use disposable lancet.
2. Use high quality slides that are new and thoroughly cleaned. Slides must be fat-free. Fingers must not touch slide surfaces. Slide must not touch skin of patient.
3. Keep blood films out of dust and away from flies and other insects.
4. Keep blood films away from excessive heat such as radiator or oven.
5. Never use oxalated or heparinized blood for making blood films.
6. Never squeeze finger or ear lobe to obtain blood. Remove and discard first drop or two of blood and wipe skin dry. Blood must freely ooze out after skin puncture.

7. Pick up a very small drop of blood with the slide (do not touch skin) so that it is about 1/4 inch from the end of the slide. Approach the drop with another slide at about a 30° angle (Figure 4-2). Allow blood to run across the edge of the spreader slide, then draw it out full length as illustrated. The film should not touch the margins of the slide; large cells tend to accumulate in groups at the edges and the small cells, such as lymphocytes and normoblasts, go to the center if the film is not free of the slide margins.
8. Do not use too large a drop of blood or the film will be too thick. Do not draw out the drop too rapidly or, again, the film will be thick and will not extend the length of the slide.
9. Allow to dry. Stain with HEMA-TEK Stain Pak according to operating instructions (see Section 3). Examine as soon as possible. Keep out of direct sunlight. File slides separately in cool, dry place.

Stain Evolution

It is axiomatic that one must obtain good staining of blood films in order to perform a proper examination. Such stains are provided automatically, consistently and uniformly by HEMA-TEK Slide Stainer when HEMA-TEK Stain Pak is used as a companion item as specifically designed.

The art of cytologic staining has slowly evolved into that of a science, but our indebtedness and closeness to the art still remains clearly evident. Romanowsky¹, in 1890, discovered that by mixing old, mold-covered solutions of methylene blue with eosin he could identify malaria parasites and differentiate leukocyte nuclei and granules. Unna², in 1891, stained mast cells with an alkaline solution of methylene blue which later proved to have a composition similar to the stain used by Romanowsky. The Unna stain was called "polychromed methylene blue" because of its metachromatic effects. Malachowski³, also in 1891, recognized the instability of polychrome methylene blue and also experimented with the addition of alkali. Jenner⁴, in 1899, used the precipitate from mixtures of aqueous methylene blue and aqueous eosin dissolved in methanol to produce a stain. This procedure was also exploited by Reuter⁵ and Leishman⁶ in 1901. Wright⁷, in 1902, altered Leishman's method by changing the time and temperature used to prepare polychrome methylene blue from 12 hours at 65° C to one hour at 100° C. He also used Li₂CO₃ instead of KOH used by Leishman. His stain proved to be too intense and in 1910⁸ was modified.



Figure 4-1

HEMA-TEK ACCESSORIES

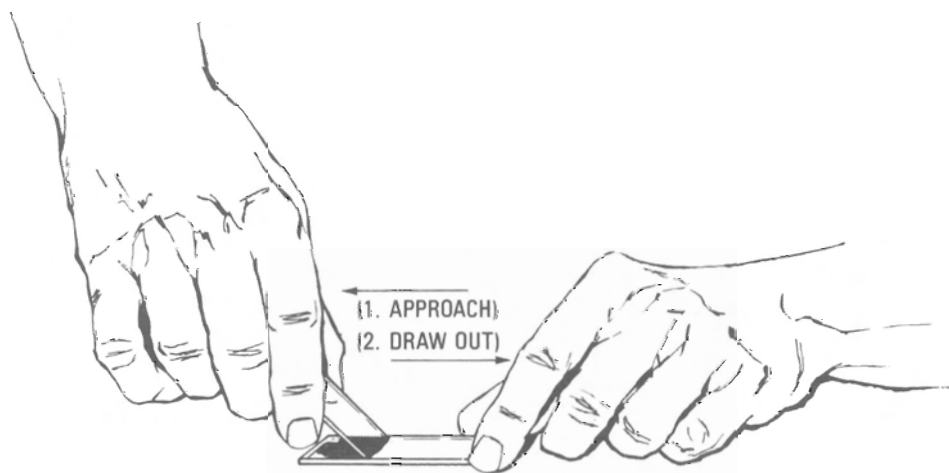


Figure 4-2:

MAKING BLOOD FILM ON SLIDE

In the 1930's and 1940's, R.D. Lillie⁹⁻¹³, then a Senior Surgeon of the U.S. Public Health Service, carried out an extensive series of tests which resulted in the commercial use of $K_2Cr_2O_7$ to polychrome methylene blue, but in 1944 he ruefully stated, "The capriciousness of Wright's stain and its variations in staining from one sample to another have long been a matter of concern to hematologists." Lillie did much to add to our knowledge of staining techniques but the instability and variability of Wright's stain still remain a matter of concern. Because of this problem, Ames Division has carried out extensive testing procedures for several years with polychrome methylene blue and various compositions of buffer. The complexity of the problem has been well appreciated. It has been found, however, that the stain developed specifically by Ames Division for HEMA-TEK Stain Pak to be used with HEMA-TEK Slide Stainer will provide consistent differential staining characteristics for all cytologic blood components and, of additional critical value, will provide stability and uniform reproducibility. The stability of the stain is insured by the addition of a chemical stabilizing agent.¹⁵

SPECIALIZED USAGE OF HEMA-TEK SLIDE STAINER AND STAIN

Although the major function of HEMA-TEK Stain Pak is to stain conventional blood films on glass slides, certain specialized usages have evolved.

Staining of Bone Marrow Slides: Many laboratories stain bone marrow films with the stain used for blood films. The procedure involves using the "squash" technique for film preparation and staining the slide once on the HEMA-TEK Slide Stainer. The stained slide is placed back in the HEMA-TEK Slide Stainer and stained a second time to obtain optimum penetration of stain in the thick film. A Technical Bulletin, *Staining of Bone Marrow Slides*, describing this procedure is available.

Modified Cover-Slip Method: A technique has been devised for staining blood films with HEMA-TEK Slide Stainer to provide quality parallel to the cover-slip method. The modified method involves the use of a cover-slip and a glass slide. A small drop of blood is placed on the slide and a cover-slip is used as the spreader and then discarded. The resulting film gives uniform cell distribution and is processed through HEMA-TEK Slide Stainer in the regular manner. A Technical Bulletin, *Modified Cover-Slip Method*, describing this procedure is available.

To obtain the bulletins mentioned above, contact Ames Customer Service Communications by calling toll free 1-800-323-6063.

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SECTION 5

DAILY MAINTENANCE

GENERAL

HEMA-TEK® Slide Stainer is a precision instrument, designed to provide many hours of trouble-free operation with a minimum of maintenance.

Cleaning of the platen and tubing after each day's use is vitally important in maintaining consistently high quality staining results. Instructions for proper cleaning are provided below.

STAIN TUBING AND CANNULA

The tubing carrying the stain should be cleaned at least daily. Listed below is a procedure for cleaning the stain tubing:

1. At the end of each day's use, remove stain, buffer and rinse cannulas from HEMA-TEK Stain Pak bottles. (Buffer and rinse cannulas and tubing do not require cleaning. The cannulas are removed in order that buffer and rinse are not wasted during the stain tubing cleaning process.)
2. Place the stain cannula, with tubing attached, into a container of methanol and lift operating lever to "PRIME." Holding the lever in this position, continue to pump methanol through stain tubing until it is thoroughly rinsed — clear solution appears on platen.
3. After the stain tubing has been cleaned, remove cannula from methanol and continue to "PRIME" until tubing is emptied of all solution.

PLATEN

The platen requires cleaning at regular intervals —after each use is considered optimum. Staining of a large number of blood films will result in precipitation of stain solution in the mixing grooves of the platen. The recommended procedure for cleaning the platen is:

1. Lower operating lever to "off" and carefully flood the working area of the platen with methanol.
2. Using a soft, disposable tissue, wipe the platen clean. Carefully wipe from *right to left only*, taking care not to scratch the platen.

CAUTION: *Do not wipe from left to right—damage to sensing switch fingers may result from careless cleaning practices.*

WASTE TANK

The waste tank should be emptied and rinsed with water daily, as well as after installing a new Stain-Pak.

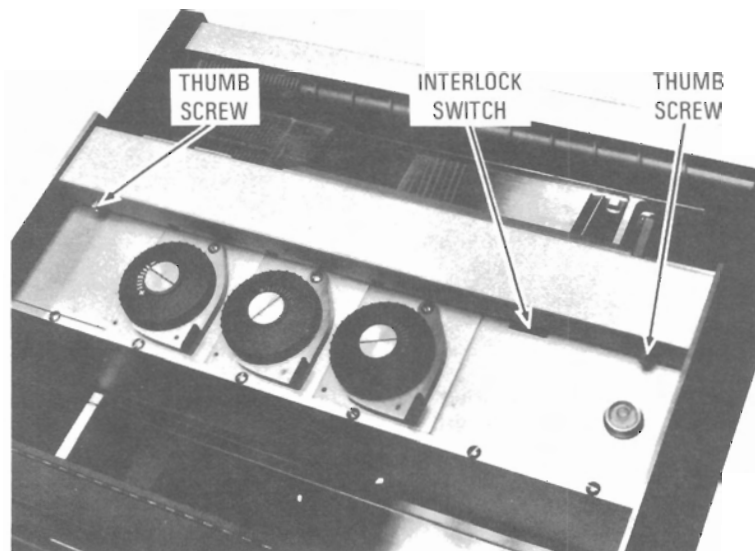


Figure 6-1

THUMB SCREWS AND INTERLOCK SWITCH

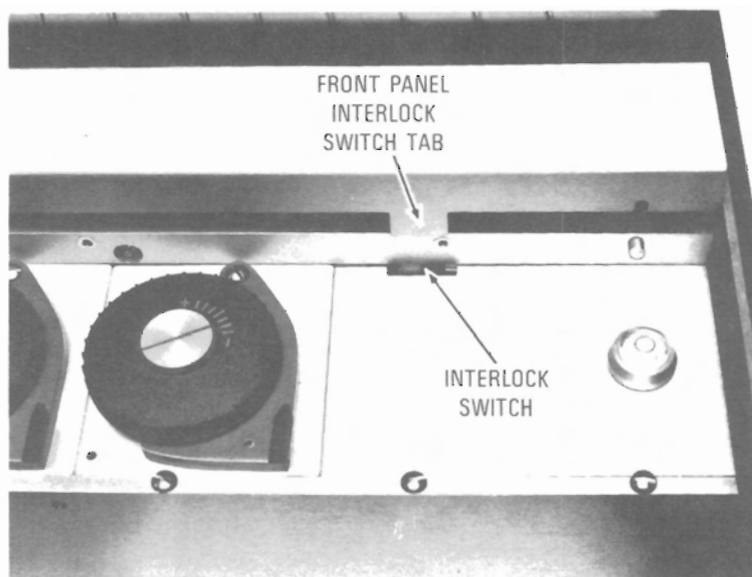


Figure 6-2

FRONT PANEL INTERLOCK SWITCH TAB

SECTION 6

PERIODIC MAINTENANCE

BACK AND FRONT TROUGHS

The back and front troughs of HEMA-TEK® Slide Stainer function as drains for excess stain. Buffer and rinse residue may accumulate and interfere with proper drainage. Careful cleaning of the back and front troughs is suggested on a weekly basis. The recommended procedure for proper cleaning is as follows:

1. **Remove the line cord from the AC electrical outlet.**
2. Lift the top cover of the instrument.
3. Loosen the two thumb screws and carefully raise the front panel so the back trough is completely exposed and easily accessible (see Figure 6-1). Hold panel in raised position until cleaning is completed.
4. Flood the troughs with methanol to loosen any precipitated stain that may be present.
5. Using an applicator stick with a cotton swab attached, wipe from right to left along the length of the back trough to remove all the excess residue. Do the same in the front trough.

NOTE: Care should be taken not to scratch the platen surface. Other exposed areas that might be accidentally stained should be cleaned in the same careful manner.

6. Return the front panel to its normal position and tighten the two thumb screws.

NOTE: The front panel interlock switch tab that activates the interlock switch must be placed into the slot so that the switch is activated (Figure 6-2).

SECTION 7

TROUBLESHOOTING

QUALITY OF BLOOD FILMS CHECKLIST

When blood films stained by the HEMA-TEK® Slide Stainer appear not to have the quality desired, the first tendency is to assume that the stain solution is at fault. Frequently, other factors are the cause of the poorly-stained blood films. The following checklist may be helpful to isolate the problem when quality of blood films is questioned.

- Improper setting of volume adjustments may lead to poor quality blood films. (See Pump Volume Adjustment, Section 3.)
- Blood may be old blood or contain incorrect anti-coagulant.
- The film may be too thick, too thin, or spread unevenly.
- The blood film was inadequately dried.
- Slides were not clean; even new slides are not necessarily clean slides.
- Warped slides will stain unevenly.
- Venting of HEMA-TEK® Stain Pak containers is necessary for even delivery of stain, buffer and rinse solutions.
- HEMA-TEK Slide Stainer must be primed or poor staining will result.
- The stain tubing, cannula, spouts and orifices may be plugged. Daily flushing of stain tubing is recommended to prevent plugging. (See Cleaning Instructions, Section 5.)
- Dirty platen or grooves result in uneven, low-quality staining.
- A bent platen hinders diffusion of stain solution, buffer and rinse.
- A burr on conveyor spiral can lift slides and result in poor staining.
- Dirty microscopes or inadequate lighting may give impression of a poor blood film.

Operate HEMA-TEK Slide Stainer with HEMA-TEK Stain Pak. Do not use any other stain solution. HEMA-TEK Stain solution quality is carefully checked at time of manufacture and will not change under ordinary environmental conditions. See warranty information at the front of this manual.

When dealing with any problem in HEMA-TEK® Slide Stainer, it is essential to determine which portion of the system is the source of the trouble. A systematic approach should be employed to isolate the problem. If the problem cannot be isolated or is beyond the scope of this manual, contact Ames Customer Service by calling toll free 1-800-323-6063 (continental U.S. only).

The following outlines contain possible problems that could occur during instrument operation. Problems relating to specimen processing and staining characteristics are listed in the Blood Films Quality Checklist. Problems relating to instrument electrical and mechanical operations are listed in the Instrument Troubleshooting Chart. Probable causes and recommended remedies are included.

INSTRUMENT TROUBLESHOOTING CHART

Trouble	Probable Cause	Remedy
"ON" signal light fails to go "on" but drive, pump and fan motors operate.	1. Light burned out. 2. Open circuit in associated wiring.	1. Replace light assembly. See Section 8, Paragraph C. 2. Contact distributor.
Pumps run but do not deliver solution during or after priming.	1. Stain Pak near empty or empty. 2. Pump tubing collapsed from use, or perforated. 3. Under platen tubing from front wall to platen clogged with foreign matter. 4. Tubing accidentally pulled off platen nipple. 5. Cannula openings obstructed with debris.	1. Replace with new Stain Pak. See Section 3. 2. Replace pump tubing. See Section 8, Paragraph D. 3. Replace with new tubing. See Section 8, Paragraph E. 4. Place tubing back on nipple. 5. Remove cannulas from solution bottles and clean away any debris with cloth and alcohol.
Unit fails to turn "on" when operating lever lifted.	1. Power cord not plugged into wall outlet. 2. Line fuse blown. 3. Fuse blown or circuit breaker tripped in electrical circuit of building. 4. Front panel interlock switch not properly activated. 5. Instrument electrical failure.	1. Plug power cord in. 2. Unplug unit and replace fuse. See Section 8, Paragraph B. 3. Have fuse replaced or circuit breaker reset. 4. Check front panel for proper seating of interlock switch tab against interlock switch arm. See Section 6, No. 6. 5. Contact distributor.
"STAIN" pilot light not functioning properly.	1. Stain Pak empty. 2. Stain Pak not properly positioned in well. 3. Light burned out. 4. "STAIN" pilot light switch not operating correctly. 5. Switch or associated circuit defective.	1. Replace with new Stain Pak. See Section 3. 2. Rearrange Stain Pak so it moves freely up and down on the right end. 3. Replace light assembly. See Section 8, Paragraph C. 4. Readjust switch. See Section 8, Paragraph F. 5. Contact distributor.

INSTRUMENT TROUBLESHOOTING CHART

Trouble	Probable Cause	Remedy
Improper mixing action between stain and buffer on platen.	1. Instrument not properly leveled.	1. Adjust leveling legs so bubble is centered in circular level. See Section 2, Installation.
	2. Inadequate pump volume setting.	2. See PUMP VOLUME ADJUSTMENT, Section 3. Contact distributor if unable to adjust properly.
Uneven staining.	1. Mixing grooves on the buffer portion of platen are dirty.	1. Clean mixing grooves. See Section 5, Daily Maintenance.
	2. Too much solution being pumped causing poor mixing of stain and buffer.	2. See Pump Volume Adjustment Section 3.
	3. Warped slides	3. Replace slides.
Pale staining.	1. Proper stain to buffer ratio has not been achieved.	1. See PUMP VOLUME ADJUSTMENT Section 3.
	2. Stain volume adjusted too high. Increasing stain volume may <i>decrease</i> stain intensity.	2. See PUMP VOLUME ADJUSTMENT Section 3.
	3. Deteriorated or out-of-date Stain Pak	3. Replace Stain Pak.

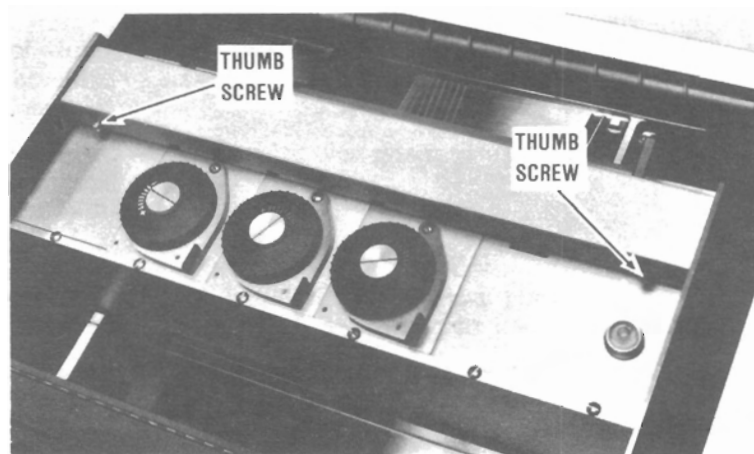


Figure 8-1
THUMB SCREWS AND INTERLOCK SWITCH

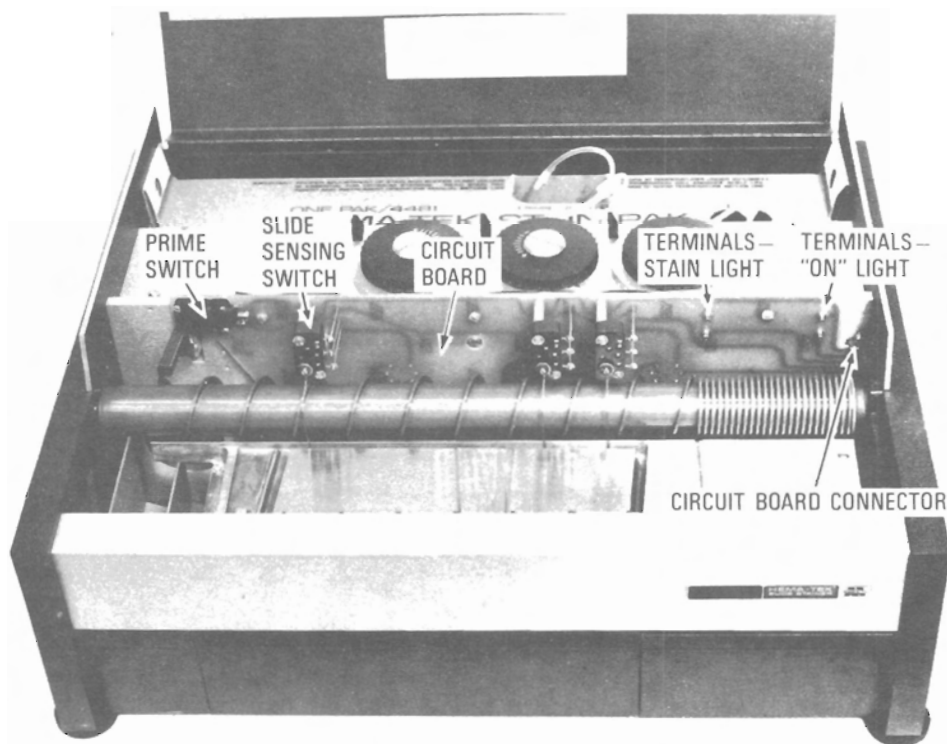


Figure 8-2
TOP FRONT PANEL REMOVED

SECTION 8

MINOR REPAIR

This section is provided as an aid for minor instrument repair and adjustment. The procedures must be completely understood before being attempted and then only with discrete care. If any procedure appears to be too complex, it is recommended that Ames Customer Service be contacted by calling toll free 1-800-323-6063 (continental U.S. only).

CAUTION: Switch instrument "OFF" and remove power line plug from wall outlet prior to performing any repairs.

A. Special Equipment

The only special equipment required in the minor repair of HEMA-TEK® Slide Stainer is a 350 gram weight, which is used for checking the STAIN light switch. (See paragraph C.)

B. Replacement of Fuse

1. **WARNING: Disconnect the power line plug from the AC electrical outlet.**
2. Remove right hand access panel from side of instrument by removing two screws (see Figure 8-7). Fuse holder is mounted to the rear of this panel.
3. Remove defective fuse from holder clips and insert a new fuse of correct type and current rating: Type 3 AG, 2 amp.
4. Install right hand access panel and fasten with two screws.
5. Plug in line cord and turn the instrument "on."

NOTE: If fuse blows again, remove line cord from outlet and contact distributor.

C. Replacement of "STAIN" Pilot or "ON" Signal Light Assembly

1. **WARNING: Remove line cord from the AC electrical outlet.**
2. Lift top cover of instrument.
3. Loosen two thumb screws (Figure 8-1) inserted through notches in back of top front panel. Lift panel from front wall exposing printed circuit board and leads for "STAIN" pilot light and "ON" signal light. (Refer to Figure 8-2.)
4. Unplug leads from circuit board for whichever light is to be replaced.
5. Unsnap burned-out light assembly from front panel.

6. Snap new light assembly into panel and plug leads into printed circuit board.

7. Place front panel over front wall and operating lever, locating notches on thumb screws. Tighten screws.

NOTE: Front panel cover must be seated properly to activate safety interlock switch (Figure 8-1).

8. Replace line cord into AC electrical outlet and turn instrument "on" to check light operation.

NOTE: To adjust "STAIN" pilot light switch, see paragraph F in this section.

D. Replacement of Pump Tubes

If any one of the three pumps fails to deliver the proper amount of solution at the adjusted volume setting, it is recommended that all pump tubes be replaced with HEMA-TEK® Pump Tube Set. The procedure is as follows:

NOTE: Each tube is numerically coded to correspond with the numbers of the Stain Pak. Stain tube is coded 1, buffer tube is coded 2, and rinse tube coded 3 (See Figure 8-3.).

1. Remove each cannula from the Stain Pak.
2. Run instrument with operating lever in "PRIME" position until solutions are pumped out of tubes.
3. Lower operating lever to "OFF" position.
4. Disconnect tubes from cannulas and from the recessed nipples located in wall in front of the pumps. These nipples are indicated at point "A" on Figure 8-4.
5. To remove each tube from pump arm, push thumb tab on pump arm, shown at point "B" on Figure 8-4, to the left as far as possible as shown at point "C." While holding thumb tab in this position, pull plastic cuff on tube at point "D" in direction as shown, until tube is completely out of pump arm.
6. Attach coded end of each new tube to its respective cannula, in the order 3, 2, 1 — rinse, buffer and stain.
7. Extend each new tube to its respective pump and thread end into hole in the pump arm at point "E." Push thumb tab to the extreme left as before and push tube through until plastic cuff is flush against pump arm, as shown at point "F." Release pump arm.

NOTE: If difficulty is encountered in threading tube through the pump housing, turn instrument "on" and lift operating lever to "PRIME" for just a few seconds. This will cause the rollers inside the pump housing to rotate slightly and relieve the interference. (See Figure 8-5.)

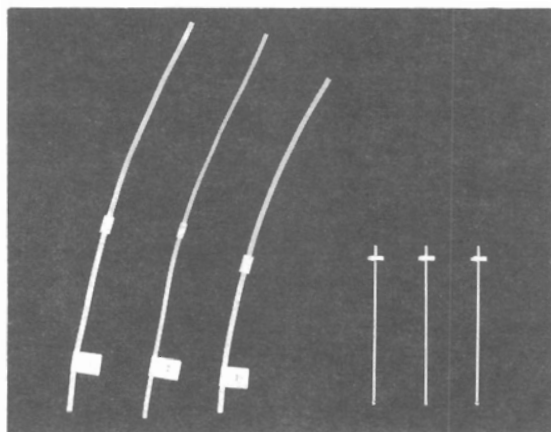


Figure 8-3
HEMA-TEK® PUMP TUBE SET AND
HEMA-TEK® CANNULA SET

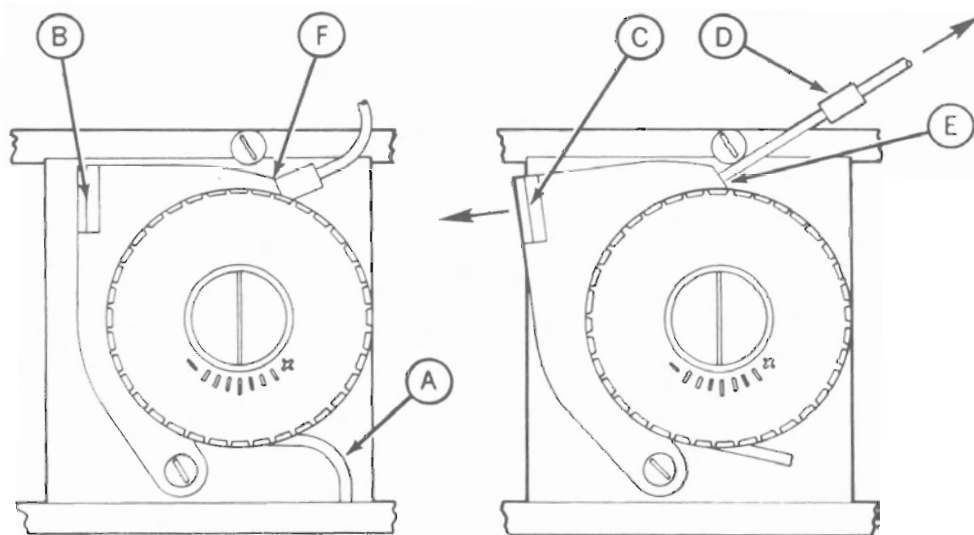


Figure 8-4
REPLACING PUMP TUBE — DIAGRAM

8. Connect each tube to its proper recessed nipple, at point "A."

NOTE: If difficulty is encountered in connecting tube to its nipple, use ordinary tweezers to grasp and attach tube. (See Figure 8-6.)

9. Prime pumps until solutions in tubes are clear of all air bubbles. Reset volume controls.

E. Replacement of Under Platen Tubing

The tubing between the spout under the platen and the nipple behind the switch board, in the front wall, should be replaced periodically, particularly the stain tubing.

Replace tubing as follows:

1. **WARNING: Turn instrument "OFF" and disconnect the power line plug from the AC electrical outlet.**
2. Loosen two thumb screws and carefully remove the front panel. (See Figure 8-1.)
3. Disconnect "STAIN" and "ON" lights by unplugging wire leads at the printed circuit board.
4. Remove the waste drawer.
5. Disconnect the stain tubing attached to the nipple located behind the switchboard, in front panel.
6. Disconnect tubing from platen by reaching underneath the platen through the waste tank area, and pull tubing free.
7. Select one of the new sections of platen tubing and connect it to the nipple for the stain tubing.
8. Thread tubing behind switchboard and under platen.

NOTE: If difficulty is encountered in threading tubing behind switchboard, loosen three screws and gently pull forward on switchboard to provide access.

9. Connect tubing to the stain spout under the platen. Check all connections to make sure tubing is securely in place.
10. Buffer and rinse tubing are replaced in a similar manner as stain tubing. They are connected to their respective nipples behind the switchboard and then connected to the buffer and rinse spouts under the platen.
11. Place waste drawer back in instrument.
12. Connect "STAIN" and "ON" lights.
13. Install front panel and tighten two thumb screws.

F. Adjustment of "STAIN" Pilot Light Switch

The "STAIN" pilot light switch is preset to turn off the "STAIN" pilot light when the solutions in the Stain Pak are low. At this point a reserve supply sufficient to process approximately 20 slides is still available.

To check for correct operation, place a 350 gram weight on the right end of the spring loaded plate located at the bottom of the Stain Pak well. The "STAIN" pilot light should not go on. Light finger pressure applied to the plate should make the "STAIN" pilot light glow—and light should go out when finger pressure is removed. If adjustment is required, proceed as follows:

1. Remove right hand access panel from side of instrument by removing two securing screws from right rear. (See Figure 8-7.)
2. Loosen screw and slide spring bracket up or down to adjust tension on spring. (See Figure 8-8.)
3. Tighten screw.
4. Test for correct "STAIN" pilot light operation as outlined above and readjust spring tension if necessary. Test again for correct operation.
5. Reinstall right hand access panel.

G. Adjustment of Sensing Switch Fingers

CAUTION: Careless cleaning practices could force the sensing fingers out of alignment.

The slide sensing switches are provided with fingers which extend near surface of the platen. Correct alignment of these fingers is important to insure proper timing of the slide processing cycle. The following measurements are switch actuating locations. Move glass slide right to left on platen to find switch actuating point. (Refer to Figure 8-9.)

1. Loosen two thumb screws and carefully remove front panel. (See Figure 8-1.)
2. Measure distance from left edge of platen groove to stain sensing finger. Measurement should be 2 1/2 inches. (See Figure 8-10.)
3. Measure distance from left edge of platen groove to buffer sensing finger. Measurement should be 4 inches.
4. Measure distance from left edge of platen groove to rinse sensing finger. Measurement should be 9 inches.

NOTE: The above measurements may require readjustment of sensing finger right or left to activate the sensing switch at the proper time.

5. If measurements do require adjustment, sensing fingers can be reached by following the first three steps in paragraph C, this section.



Figure 8-5
THREADING TUBE THROUGH PUMP ARM



Figure 8-6
CONNECTING PUMP TUBE TO NIPPLE

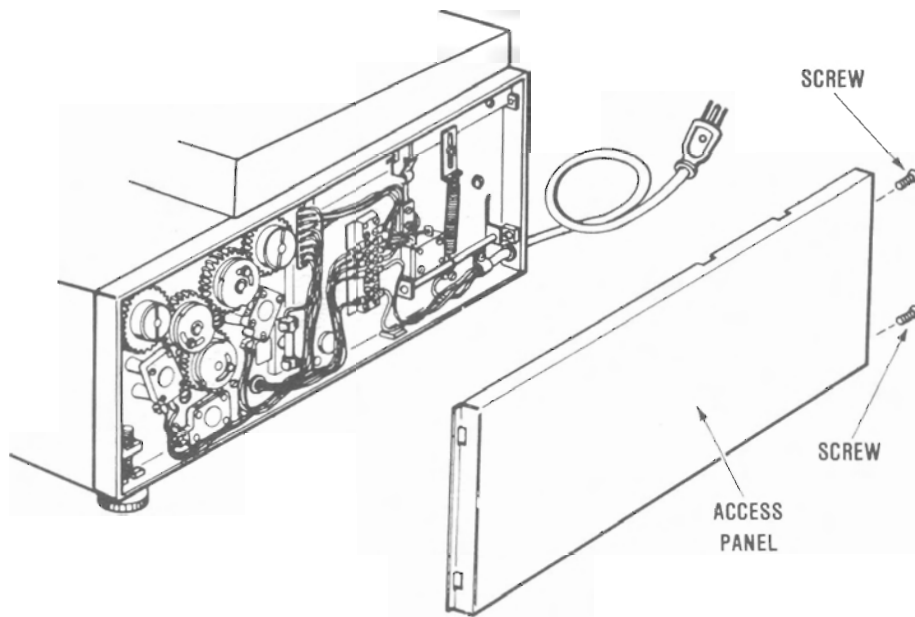


Figure 8-7
ACCESS PANEL

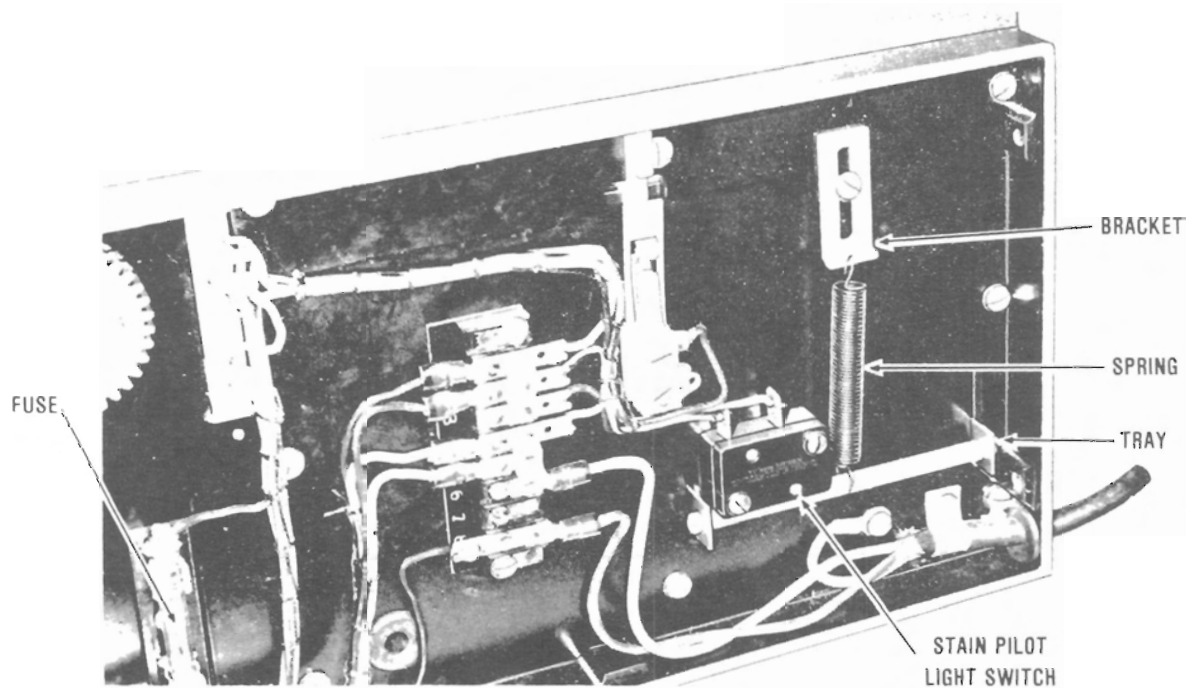


Figure 8-8
STAIN PAK TRAY ADJUSTMENT
(ACCESS PANEL REMOVED)

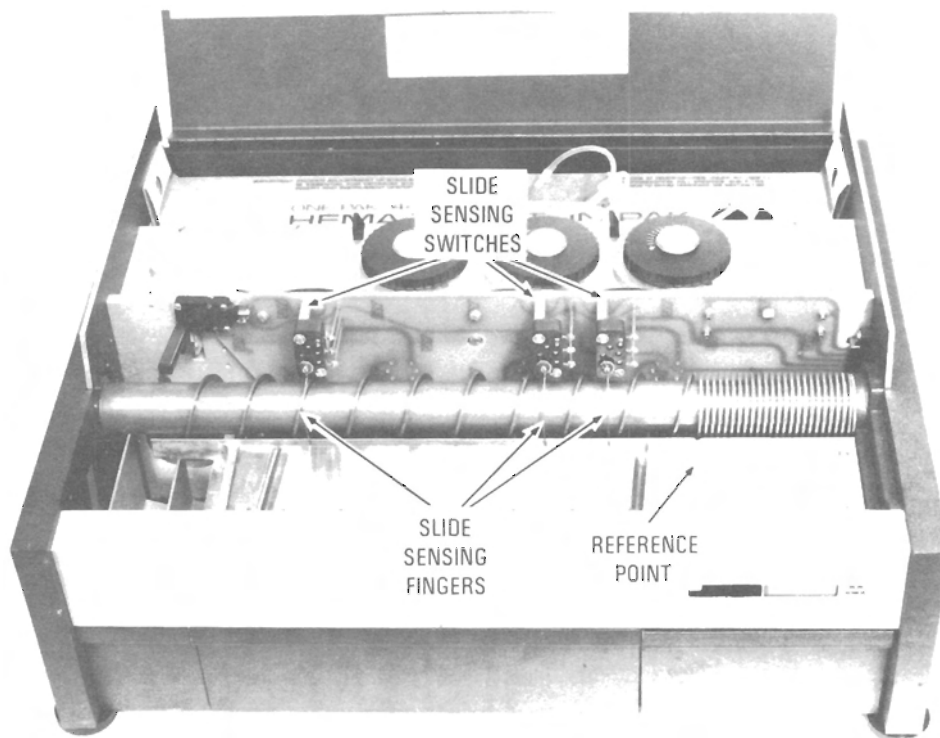


Figure 8-9
SENSING SWITCHES AND FINGERS

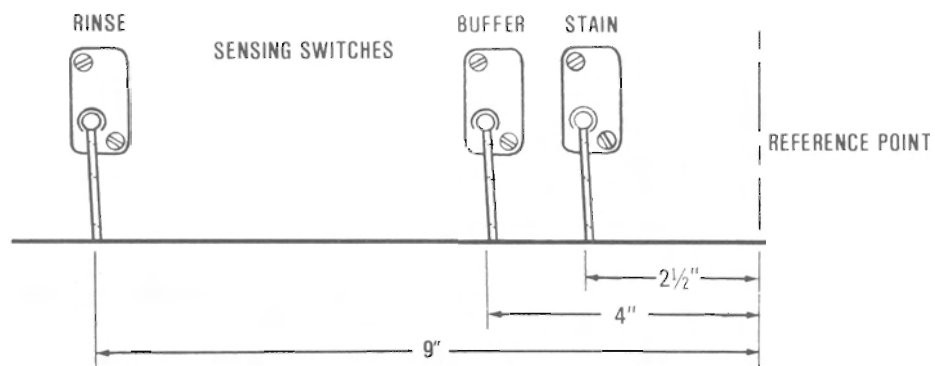


Figure 8-10
SWITCH ADJUSTMENT

SECTION 9

SERVICE

When a HEMA-TEK® Slide Stainer failure occurs which requires servicing, contact Ames Customer Service by calling toll free 1-800-323-6063 (continental U.S. only). Before calling for service, collect the information stated in the PRESERVICE CHECKLIST and give it to the representative. This information will help to identify the probable cause of instrument failure.

PRESERVICE CHECKLIST

1. Instrument serial number 9273
2. Instrument Installation Date 5/88
3. Unit is plugged into grounded power supply. YES ☐ NO ☐
4. ON/OFF switch indicator bar *lights*. YES ☐ NO ☐
5. Fuse has been checked. YES ☐ NO ☐
6. Slide drying system operates. YES ☐ NO ☐
7. Conveyor spirals are operating. YES ☐ NO ☐
8. STAIN pilot light operates properly. YES ☐ NO ☐
9. All three stations pump solution. YES ☐ NO ☐
10. All stations pump solution at the proper time. YES ☐ NO ☐
11. Instrument is level. YES ☐ NO ☐
12. Platen is cleaned each day. YES ☐ NO ☐

PARTS LIST

PART NO.	DESCRIPTION
40151006	Fuse 2 Amp 3AG
9400132	Light Assembly (ON)
9400133	Light Assembly (STAIN)
4481	HEMA-TEK
4482	HEMA-TEK Pump Tube Set
4483	HEMA-TEK Cannula Set
4484	HEMA-TEK Under Platen Tubing
99944809	Operating Manual—HEMA-TEK Slide Stainer