

---

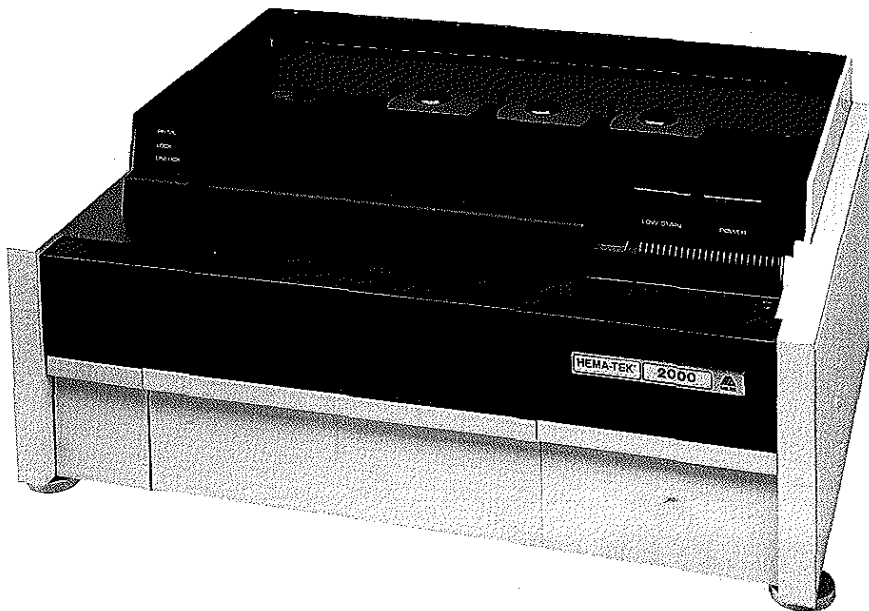
Hema-Tek® 2000

---

Slide Stainer

# Operating Manual

Model 4488  
Model 4436



# TABLE OF CONTENTS

| <b>Section</b> |   | <b>Page</b> |
|----------------|---|-------------|
| <b>1</b>       | <b>INTRODUCTION</b>                               |             |
|                | General Description . . . . .                     | 1.1         |
|                | Physical Characteristics . . . . .                | 1.1         |
|                | Slide Transport System . . . . .                  | 1.3         |
|                | Staining System . . . . .                         | 1.5         |
|                | Electrical System . . . . .                       | 1.7         |
|                | Specifications . . . . .                          | 1.10        |
| <b>2</b>       | <b>INSTALLATION</b>                               |             |
|                | General . . . . .                                 | 2.1         |
|                | Environmental Factors . . . . .                   | 2.1         |
|                | Unpacking . . . . .                               | 2.1         |
|                | Instrument Setup . . . . .                        | 2.3         |
| <b>3</b>       | <b>OPERATING INSTRUCTIONS</b>                     |             |
|                | General Guidelines . . . . .                      | 3.1         |
|                | Operating Procedures . . . . .                    | 3.1         |
|                | Stain Pak Replacement . . . . .                   | 3.6         |
| <b>4</b>       | <b>SPECIMEN PREPARATION</b>                       |             |
|                | Types of Specimens . . . . .                      | 4.1         |
|                | Specialized Usage of System . . . . .             | 4.4         |
| <b>5</b>       | <b>ACCESSORIES</b> . . . . .                      | 5.1         |
| <b>6</b>       | <b>CARE OF THE INSTRUMENT</b>                     |             |
|                | General Cleaning . . . . .                        | 6.1         |
|                | Daily Cleaning . . . . .                          | 6.1         |
|                | Platen . . . . .                                  | 6.1         |
|                | Stain Tubing and Cannula . . . . .                | 6.3         |
|                | Waste Tank . . . . .                              | 6.5         |
|                | Periodic Cleaning . . . . .                       | 6.5         |
|                | Drain Troughs . . . . .                           | 6.5         |
| <b>7</b>       | <b>TROUBLESHOOTING</b>                            |             |
|                | Checklist for Quality of Blood Smears . . . . .   | 7.1         |
|                | Troubleshooting Information . . . . .             | 7.2         |
|                | Instrument Troubleshooting Chart . . . . .        | 7.3         |
| <b>8</b>       | <b>MINOR REPAIRS/REPLACEMENTS/ADJUSTMENTS</b>     |             |
|                | A. Fuse Replacement . . . . .                     | 8.1         |
|                | B. Replacement of Light Assembly . . . . .        | 8.3         |
|                | C. Replacement of Pump Tubes . . . . .            | 8.5         |
|                | D. Replacement of Underplaten Tubing . . . . .    | 8.9         |
|                | E. Pump Volume Adjustment . . . . .               | 8.11        |
|                | F. Volume and Ratio Determination . . . . .       | 8.16        |
|                | G. Adjustment of Sensing Switch Fingers . . . . . | 8.19        |
| <b>9</b>       | <b>SERVICE AND REPLACEMENT PARTS</b>              |             |
|                | Where to Call for Service . . . . .               | 9.1         |
|                | Preservice Checklist . . . . .                    | 9.2         |
|                | Accessory Items . . . . .                         | 9.3         |
|                | Replacement Parts . . . . .                       | 9.3         |

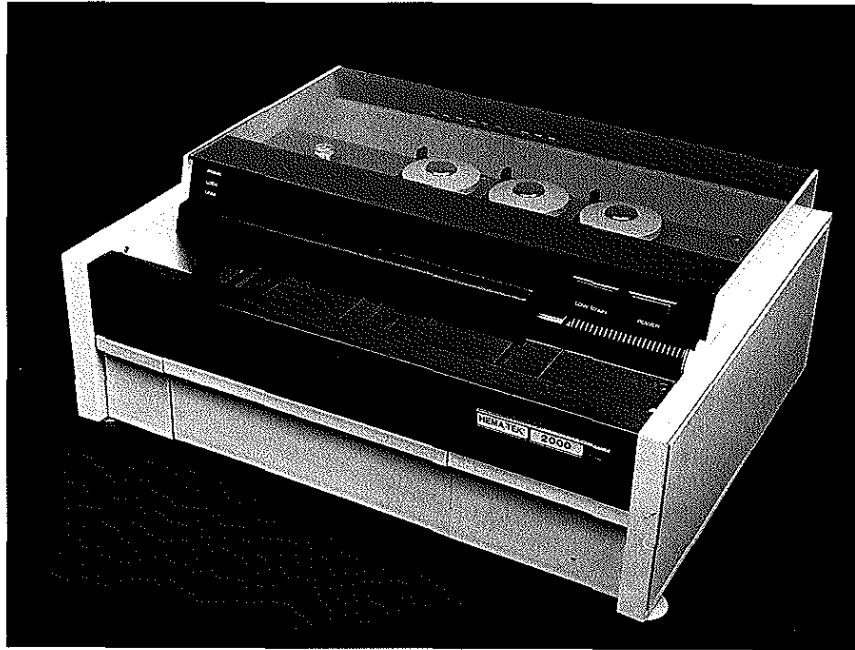


Figure 1-1  
**HEMA-TEK® 2000 Slide Stainer**

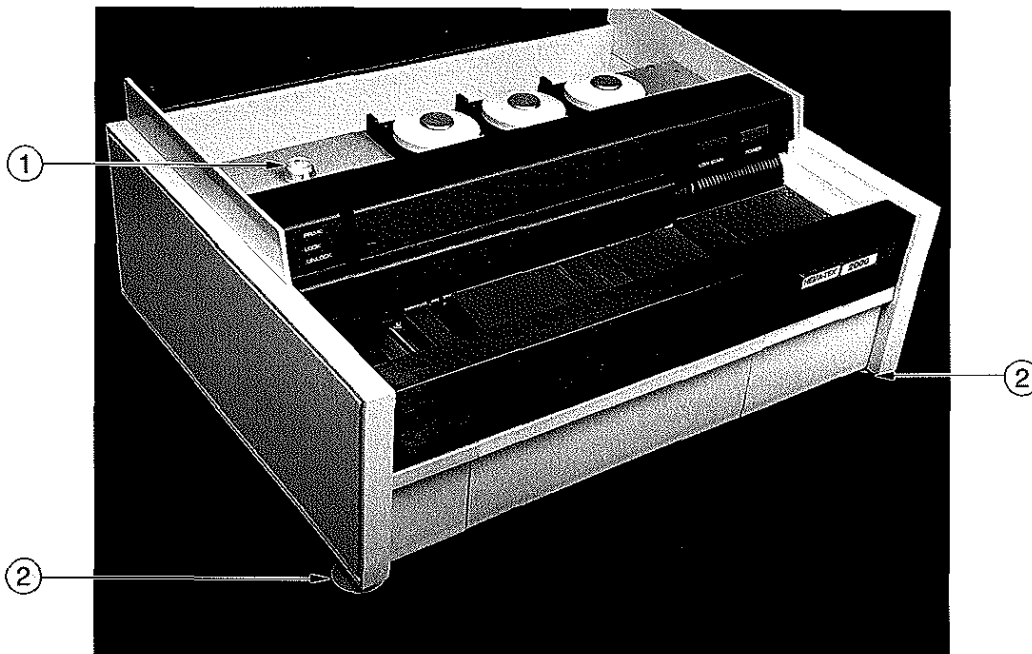


Figure 1-2  
**Circular Level and Leveling Feet**

## INTRODUCTION

### General Description

The HEMA-TEK® 2000 Slide Stainer (Figure 1-1) is a fully automated, bench-top instrument designed specifically for use in hematology. It is a self-contained, precision instrument that accepts, conveys, fixes, stains, and delivers dry blood smear preparations that are spread on standard 25mm x 75mm or 1" x 3" glass slides. The slides are stained at a rate of one slide per minute.

Two conveyor spirals move the slides along the platen. Three sensing switches are triggered sequentially as the slide moves along the platen. Each switch activates its respective solution pump, which meters and delivers the stain, buffer or rinse into the capillary space between the slide and platen. After staining and rinsing have been accomplished, the slide is dried by a flow of air from a low velocity blower; it is then deposited in a slide drawer.

Optimal results with the HEMA-TEK 2000 Slide Stainer are obtained by using one of the HEMA-TEK® Stain Paks (see Section 5, ACCESSORIES, for further information). The Stain Pak consists of one bottle each of stain, buffer and rinse solutions, and is designed for easy installation and removal from the instrument. Only HEMA-TEK Stain Paks should be used with the HEMA-TEK Slide Stainer; use of other stain packs or solutions may void the warranty.

### Physical Characteristics

(Figure 1-2)

#### Circular Level

The circular level ① is a water bubble gauge with an inscribed circle that can be observed through the clear plastic lid of the instrument. The level is screwed into the instrument panel to the left of the solution pumps, directly above the operating lever and *should not be removed from this location*. It is used to ensure the Slide Stainer is in a level position. *Proper leveling is essential for optimal stain/buffer mixing.*

#### Levelers

The feet ② under the front corners of the instrument act as levelers and may be adjusted to raise or lower the instrument to a level position. Observe the circular level to verify that the feet have been properly adjusted and the instrument is level.

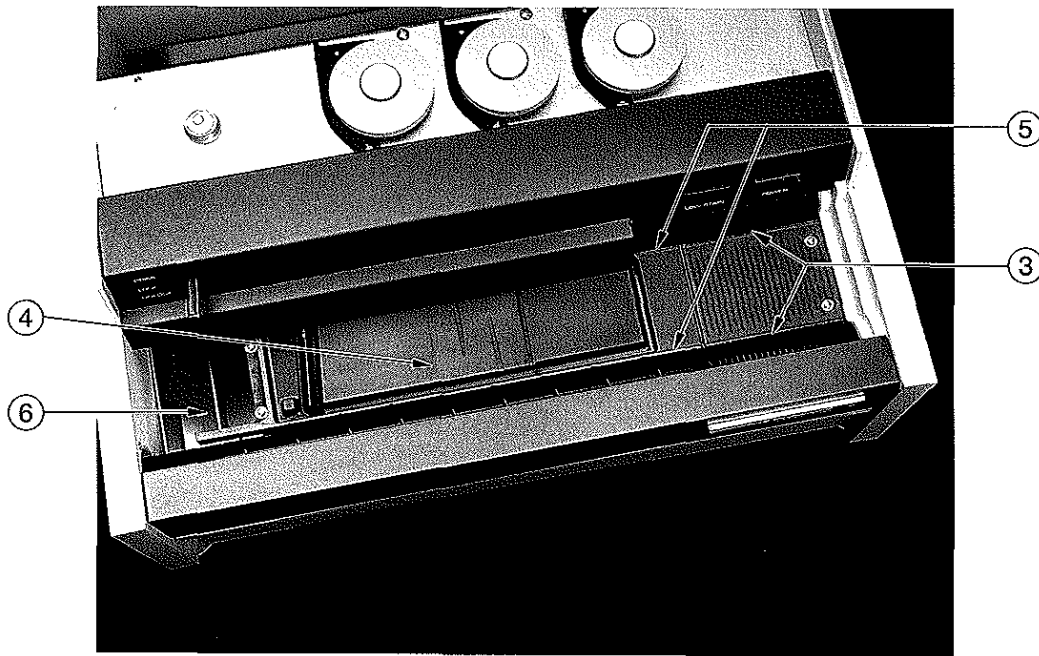


Figure 1-3  
Slide Transport System



Figure 1-4  
Slide Transport and Staining Systems

## **Slide Transport System**

(Figures 1-3 and 1-4)

### **Conveyor Spirals**

The conveyor spirals ③ are two parallel spirals with opposing grooves. Slides to be stained are fitted separately into the opposing grooves, which move the slides across the staining surface. When loading slides onto the instrument, the side covered by the blood smear is faced to the left of the operator, with the feathered edge to the back of the instrument. Slides are moved by the conveyor spirals side by side, from right to left, first at a vertical plane, then at a horizontal plane with the blood smear facing downward toward the platen.

### **Platen**

The platen ④ spans the entire front of the instrument, between the conveyor spirals. The outside ridges of the platen are elevated guide rails ⑤, which give support to the slides as they are moved along the platen. It is a precision-machined component made from a new high-performance plastic polymer material and is designed specifically for two main functions: 1) it maintains the exact volumes of the required solutions within a capillary space between the platen and the slide, and 2) it provides a mixing system for the stain and buffer. The platen also provides the necessary time interval after the rinsing step for proper drying of the slides before they are deposited in the slide drawer. A trough around the perimeter of the platen allows for drainage of used solutions into the waste tank below.

### **Slide Drying System**

The dryer is a blower type fan that runs continuously when the instrument is in operation. The air flow serves to cool the mechanical components inside the Slide Stainer, as well as to dry the slides.

### **Slide Drawer**

The slide drawer ⑥ is located below the left end of the platen. It receives the slides as they drop from the platen after being stained, rinsed and dried. The drawer will hold 100 slides.

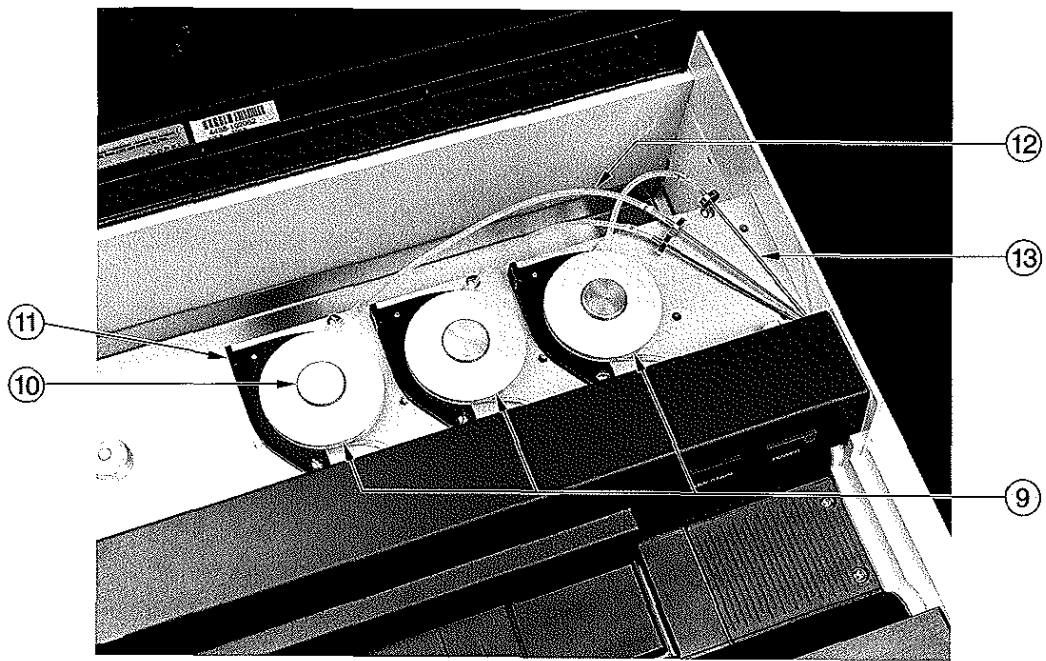


Figure 1-5  
Staining System

### **Waste Tank**

The waste tank (7) is located underneath the platen and collects used and overflow staining solutions. The waste tank should be emptied and rinsed once each day and whenever a new Stain Pak is installed (see Section 6, "Daily Maintenance").

### **Staining System**

(Figures 1-4 to 1-6)

#### **Volume Control Panel**

The volume control panel (8) tips out from the right front corner of the instrument and contains three graduated adjustment knobs. The volume of reagent being delivered can be adjusted by rotating the respective control dial, clockwise to increase the volume or counter-clockwise to decrease the volume.

#### **Solution Pumps**

The instrument has three pump assemblies (9), one for each solution. Each assembly consists of a pump motor, four rollers that are attached to the underside of a pump cap (10), and a pump arm (11); all work together to maintain a constant metering speed to provide consistent volumes of stain, buffer, and rinse, even though the line voltage may fluctuate. The amount of solution pumped is electronically adjusted through the use of the volume control knobs (8).

#### **Pump Tubing and Cannulas**

The pump tubing (12) is provided as a set of 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 that fits snugly up to the pump arm and holds the tube in position without slippage. The tubing is a special type of rubber that is resistant to leaching and brittleness. The special diameters and lengths of the tubing assure precise measurement of solutions. Use only the HEMA-TEK® Pump Tube Set with the HEMA-TEK 2000 Slide Stainer; no substitution of tubing should ever be made. Use of other tubing may result in incorrect measurement and improper staining, buffering and rinsing. Each pump tube is connected to a cannula (13) that is inserted into the appropriate bottle in the Stain Pak. Three cannulas are provided with the HEMA-TEK Slide Stainer; with proper routine cleaning, the cannulas can be used for an extended period of time.



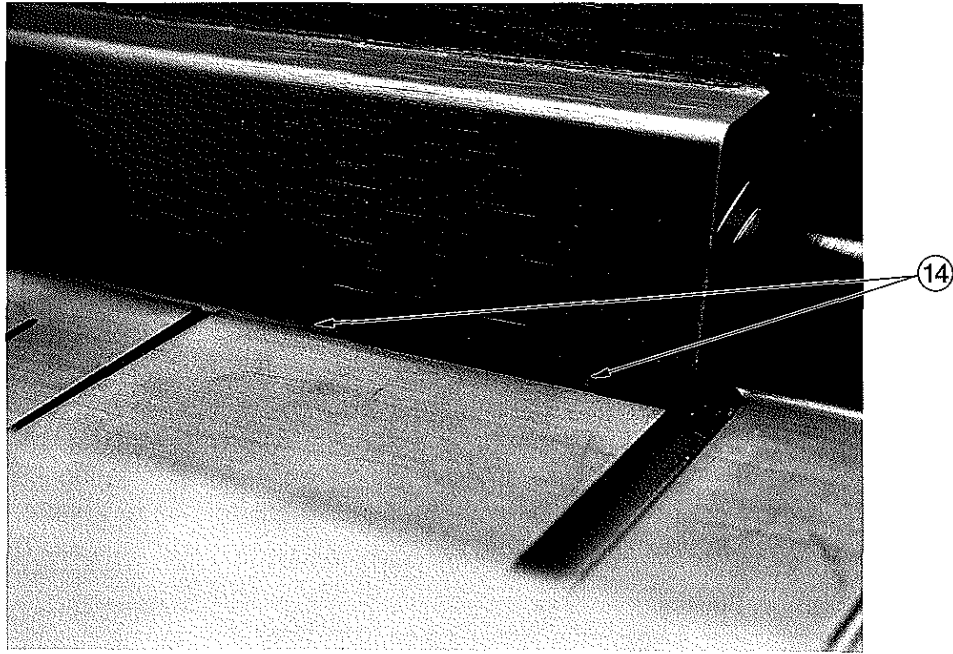


Figure 1-6  
Sensing Switches

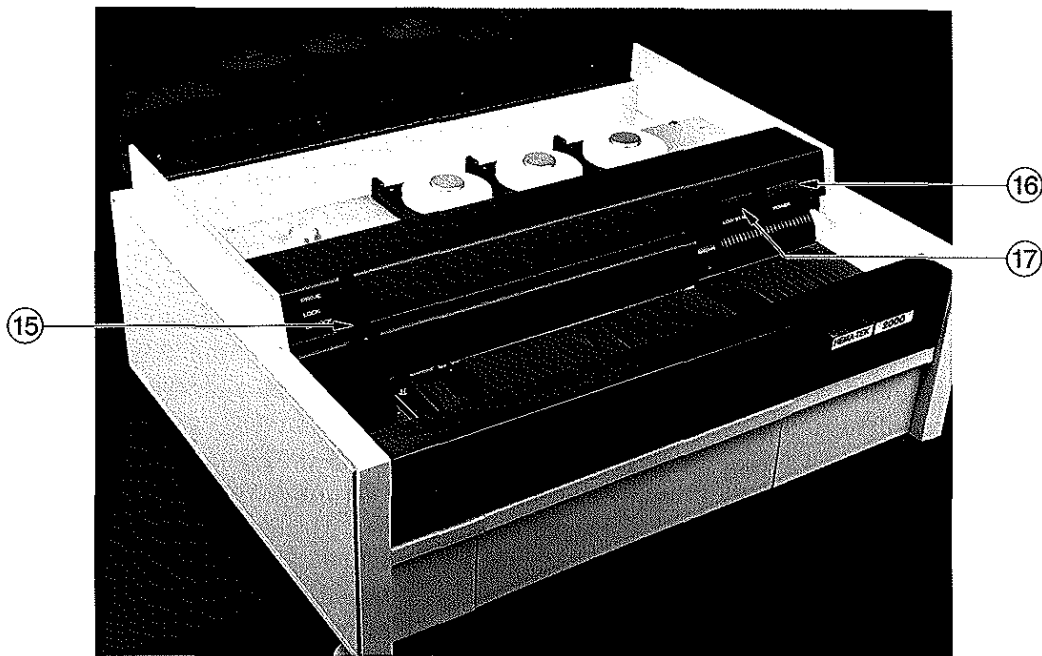


Figure 1-7  
Electrical System

### **Sensing Switches**

The sensing switches (14) are three finger-like devices located just above the back edge of the platen. When contacted, the respective sensing switch is activated, which tells the instrument that a slide is in position for the pump to run. After a specific time delay, the pumping motor for the specific reagent (stain, buffer, or rinse) is activated. The solution pumps are set so that precise volumes of stain, buffer and rinse are delivered to their respective areas on the platen. Each reagent is delivered through its respective cannula and tubing network to the platen orifice. The capillary space between the slide and the platen is then filled with the measured volume of reagent.

### **Electrical System**

(Figures 1-7 and 1-8)

### **Operating Lever**

The operating lever (15) is a multiple function, bar-shaped lever located at the front left side of the instrument, near the top. The three positions of the lever are labeled and their related functions are as follows:

1. UNLOCK releases the pressure of the reagent pump arms against the pump tubing.
2. LOCK locks the reagent pump arms into their proper position against the pump tubing.
3. PRIME provides an override control to allow the pumps to run continuously so the tubes can be primed with solutions and cleared of air bubbles. The lever must be held continuously in the PRIME position; when released, it returns automatically to the LOCK position.

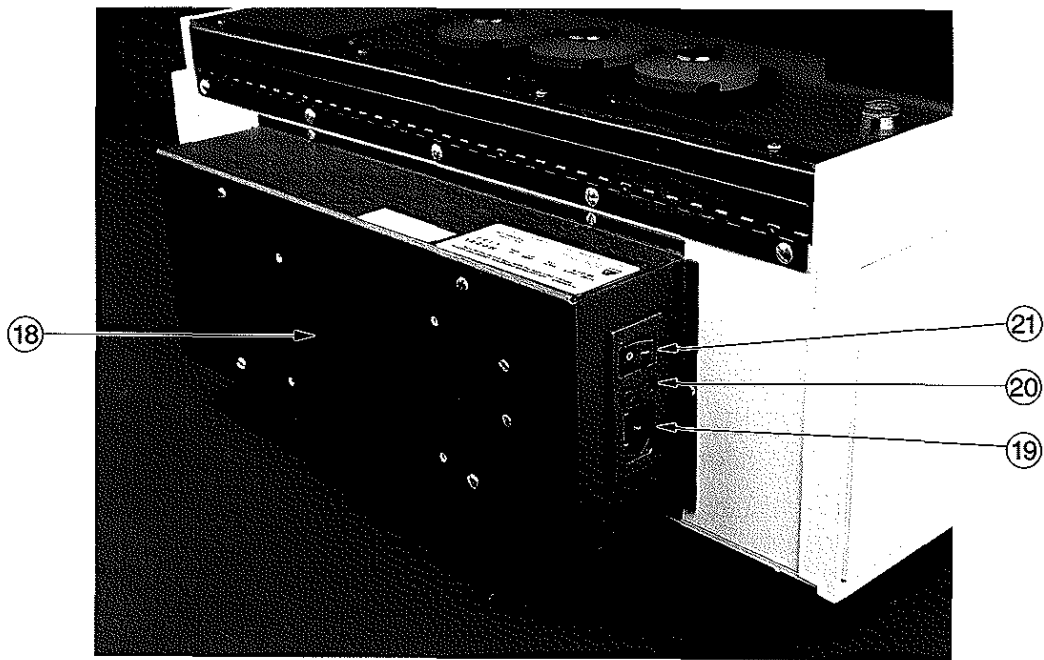


Figure 1-8  
**Electrical System – Rear of Instrument**

### **“Power” Light**

The green “Power” light (16) is located at the right side of the instrument near the top. When the instrument is turned *on*, the light illuminates.

### **“Low Stain” Light**

The red “Low Stain” light (17) is to the left of the “Power” light. It is *off* under usual operating conditions; however, when the HEMA-TEK Stain Pak contains sufficient reagents to stain only about 20 slides, a weight-sensing device activates the circuit and illuminates the light. The Stain Pak should be replaced at this time.

### **Power Module**

The power module (18) is located on the rear of the instrument; on one side of the module is the panel that contains the line cord receptacle, fuse, and power switch. The power module also converts the line current coming into the instrument to 12 volts DC, which is the voltage within the instrument.

### **Line Cord Receptacle**

The line cord connects into the line cord receptacle (19), which is located at the bottom of the panel on the power module.

### **Fuse Holder**

The fuse holder (20), in the center of the panel, holds the fuse that protects against serious electrical overload. A spare fuse is also located in the fuse holder.

### **ON/OFF Switch**

The ON/OFF switch (21) is located at the top of the panel and controls all power to the instrument.

---

## Specifications

### Power Required:

115 VAC +10% / -15%; 50/60 Hz; 0.2 Amps

Optional (Model 4436) —

100 VAC +10% / -15%; 50/60 Hz; 0.2 Amps

220 VAC +10% / -15%; 50/60 Hz; 0.15 Amps

240 VAC +10% / -15%; 50/60 Hz; 0.15 Amps

**NOTE:** The HEMA-TEK 2000 Slide Stainer has been manufactured and inspected as a 115 VAC instrument. Before being used at any voltage other than 115 VAC, the instrument line cord and/or rating label on Model 4436 must be changed in order to comply with the specific requirements of each country.

### Fuse Rating:

250 Volt, 0.4 Amps, 5mm x 20mm, Slo-Blo

### \*Line Leakage Current:

<5 milliamperes

### Dimensions:

Depth — 43.4 cm (17.1 in.)

Width — 47.0 cm (18.5 in.)

Height — 19.0 cm ( 7.5 in.)

### Weight:

17.7 kg (39 lbs.)

\*Testing protocol and allowable limits as specified by the safety standards for laboratory equipment outlined in UL1262 and CSA 22.2 No. 151.

## INSTALLATION

### General

This section provides detailed installation and setup instructions for the HEMA-TEK® 2000 Slide Stainer. The installation steps must be followed correctly to ensure proper installation, operation, and service. Read this Operating Manual carefully before attempting to operate the instrument. Follow all instructions carefully.

The HEMA-TEK 2000 Slide Stainer is a precision instrument and must be handled accordingly. Rough handling or dropping of the instrument will disturb or damage internal components. Always handle the instrument with care.

### Environmental Factors

As with all sensitive electronic instruments, prolonged exposure to excessive humidity and temperature should be avoided. Temperature should be held relatively constant to obtain the highest degree of operating stability. The ambient temperature range for operating the instrument is 18°C to 30°C (64°F to 86°F). The ambient operating humidity range is 20% to 85% relative humidity.

Locate the instrument in a *well ventilated* area, avoiding exposure to corrosive vapors or temperature extremes. Be sure it is near a power source that meets the electrical requirements (voltage) specified on the rating label located on the rear of the instrument. Avoid proximity to open windows, sinks, ovens, hot plates, open burners, radiators and dry ice baths. The instrument should not be used in an explosive atmosphere.

### Unpacking

1. Carefully remove the HEMA-TEK 2000 instrument and accessories from the shipping carton. Inspect the shipping carton and instrument for visible signs of damage. If damage to the instrument exists, immediately file a complaint with the carrier.
2. After the instrument is unpacked, place it on a firm surface in the designated work area.
3. Provided with the instrument are the following items:
  - HEMA-TEK® Pump Tube Set
  - HEMA-TEK® Cannula Set
  - Operating Manual
  - Line Cord
  - Warranty Card

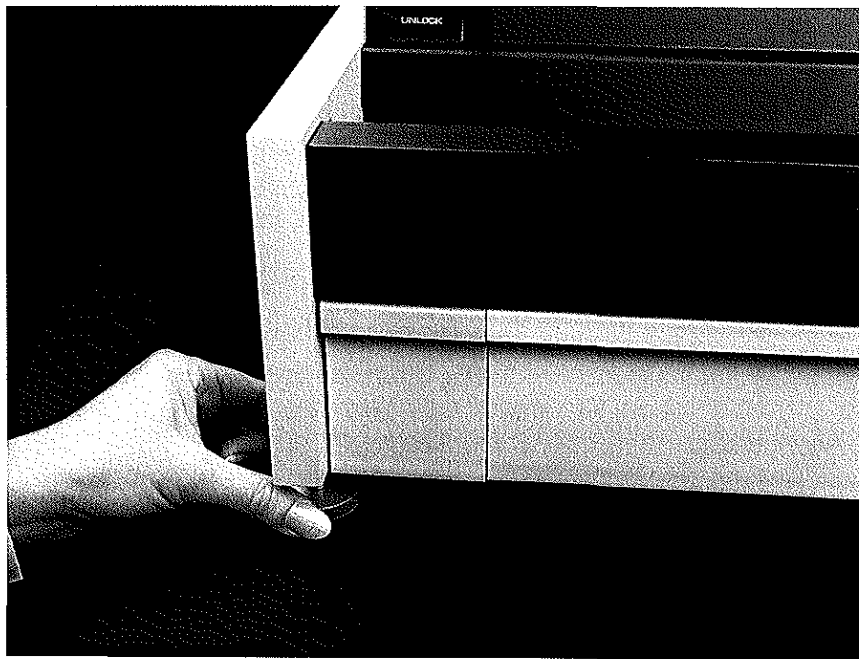


Figure 2-1  
**Leveling the Instrument**

Depending on the specific country, a multi-language sheet of rating labels may also be included. Make sure all these items have been included with your instrument.

**NOTE:** Retain the HEMA-TEK 2000 shipping carton for future use. If the instrument ever needs to be shipped, the shipping carton will afford the best protection.

## Instrument Setup

Complete the following steps to ensure proper installation and performance of your Slide Stainer.

### STEP 1 LEVEL THE INSTRUMENT

- a. Raise the hinged lid of the instrument and locate the circular level gauge on the instrument panel to the left of the reagent pumps, directly behind the operating lever.
- b. Adjust the two feet located under the front corners of the instrument to raise or lower the instrument to a level position (Figure 2-1). Observe the circular level to indicate when the feet have been properly adjusted and the instrument is level; that is, the bubble in the level should be centered within the inscribed circle. Do not remove the circular level from its location behind the operating lever.

**NOTE:** Make a final leveling check and adjustment, if needed, by watching the flow of the waste fluids during staining. Fluids should flow evenly to the drain hole at the left front corner of the waste trough.

### STEP 2 PLUG LINE CORD INTO OUTLET

Plug the appropriate end of the instrument line cord into the instrument and the other end into an appropriate grounded AC electrical outlet.

**NOTE:** Be sure the outlet supplies the proper voltage for your instrument. Refer to the rating label located on the rear of the instrument to determine the proper voltage rating.





Figure 2-2  
**Attaching Pump Tubing To Cannula**

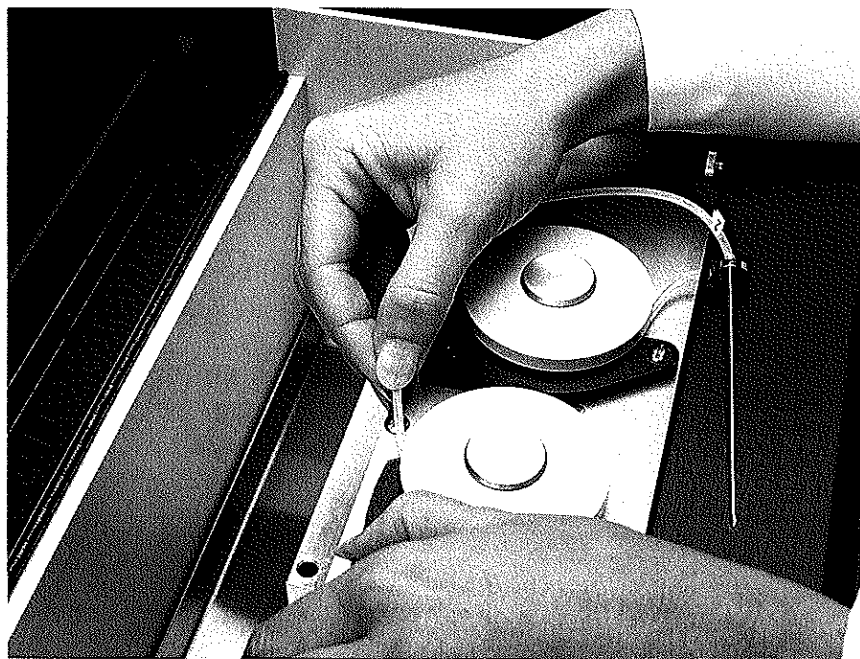


Figure 2-3  
**Threading Tubing Through Pump Assembly**

STEP 3 PERFORMANCE CHECK (PRIOR TO INSTALLING TUBING)

- a. Turn the instrument *on* by pressing the ON/OFF switch, located on the left side of the power module at the rear of the instrument, to the "ON" position. The green "Power" light will illuminate, the fan will start, and the conveyor spirals will slowly revolve.
- b. Inspect the slide dryer area for noticeable air flow.
- c. Place five blank slides into the grooves on the right side of the conveyor spirals. Be sure the slides are positioned in opposing slots, parallel to the inscribed lines on the platen. Allow the slides to automatically feed onto the platen.
- d. As the slides move down the platen, make sure the leading edge of the slides contact and activate each of the three sensing switch fingers, located along the back wall of the platen above the platen trough. As each switch is activated, the appropriate pump will activate and you will be able to observe the pump cap rotating.
- e. If the instrument has functioned properly in these steps, continue as directed below. If a problem has occurred, contact the Customer Service Dept. of Miles Inc., Diagnostics Division by calling toll free 1-800-348-8100. (Outside of the United States, contact your HEMA-TEK instrument distributor or representative.)

STEP 4 INSTALL THE PUMP TUBING

- a. Remove the three cannulas and pump tube set from their cartons. Notice that each pump tube is identified with a number, which corresponds to the reagent carried by the tubing: "1" — Stain; "2" — Buffer; "3" — Rinse.
- b. Attach the labeled end of each pump tube to a cannula (Figure 2-2).
- c. Push the operating lever down to the UNLOCK position.



Figure 2-4  
**Attaching Pump Tubing to Nipple**



Figure 2-5  
**Installing the Stain Pak**

- d. Extend each new tube to its respective pump (in numerical order from right to left) and thread the end of the tubing into the hole in the pump arm. Push the thumb tab on the pump arm to the extreme left and push the tubing through (Figure 2-3) until the plastic cuff is flush against the pump arm. Release the pump arm.  
**NOTE:** If difficulty is encountered in threading the tubing through the pump housing, lift the 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. Then return the operating lever to the UNLOCK position.
- e. Connect each tube to its proper recessed nipple, located on the back side of the circuit board housing (Figure 2-4). Be sure at least ¼ inch of tubing is connected to the nipple for a secure connection.  
**NOTE:** If it is difficult to connect the tube to its nipple, use forceps or a hemostat to grasp and attach the tubing.

#### STEP 5 INSTALL THE STAIN PAK

- a. Insert the HEMA-TEK Stain Pak carton, with the STAIN bottle to the right, into the well at the rear of the instrument (Figure 2-5). Make sure the carton is all the way down and resting in the tray at the bottom of the well. The carton should be level when properly installed. Remove the perforated tabs from the carton.
- b. Insert the appropriate cannula into its respective bottle by puncturing the center of the indentation on the bottle (Figure 2-6). Remove the cannula, turn it ¼ turn, and insert it again into the same puncture. The double puncture creates a slightly larger hole for venting. Push the cannula down until the guard at the top touches the plastic container. Repeat for each bottle.  
**NOTE:** If additional venting is desired, a second hole can be made in the top of the bottle, near the indentation. A 20 gauge needle can be placed into the hole, if needed.

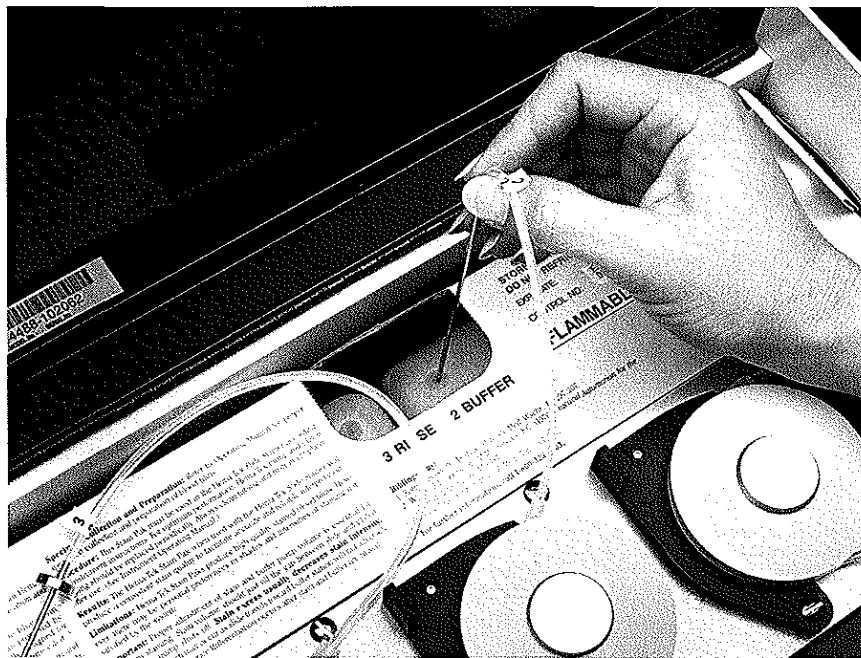


Figure 2-6  
Inserting Cannula into Stain Pak Bottle

- STEP 6 INSPECT WASTE TANK AND SLIDE DRAWER**  
Inspect the waste tank and slide drawer for proper positioning below the platen. Each should be pushed completely into its respective cavity in the front of the instrument so it is flush with the control panel on the right front corner.
- STEP 7 FAMILIARIZE YOURSELF WITH THE INSTRUMENT**  
Before beginning normal instrument use, carefully review Section 3, OPERATING INSTRUCTIONS, and Section 6, CARE OF THE INSTRUMENT, to become familiar with operating techniques and instrument cleaning requirements.
- STEP 8 CHECK PUMP VOLUMES**  
Check the pump volumes, and adjust them if necessary, by following the procedures given in Section 8, Part E, "Pump Volume Adjustment," Steps 6 and 7, and Part F, "Volume and Ratio Determination." This should be done *before* staining any patient slides for clinical evaluations.
- STEP 9 FILL OUT AND MAIL WARRANTY REGISTRATION CARD**  
Locate the serial number, found on top of the power module at the rear of the instrument. Write the installation date and instrument serial number on the Warranty Registration Card packed with the instrument. Also write the installation date and serial number in the spaces provided on the Manufacturer's Warranty page (found at the end of this manual) and in the "Preservice Checklist" in Section 9. Completely fill out the Warranty Registration Card and mail.

## OPERATING INSTRUCTIONS

Following initial installation (Section 2), the HEMA-TEK® 2000 Slide Stainer can be operated on a daily basis by the following procedures.

### General Guidelines to Ensure Optimal Staining

- Use high quality slides. Do not use warped slides. Bevel-edged slides should not be used, as they may break in the instrument.
- Make sure the blood smears are thoroughly dry before placing on the instrument for staining.
- Clean the stain tubing with methanol after each run, especially if the Slide Stainer is not to be used for one hour or more.
- Keep the staining grooves and guide rails clean, as instructed in Section 6, "Daily Cleaning — Platen." Use methanol only to clean.
- Change the pump tubing and underplaten tubing on a routine basis.
- Check the alignment of the sensing switch fingers, as instructed in Section 8, Part E, Step 6.

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

### Operating Procedures

#### STEP 1 START THE INSTRUMENT

Turn the instrument *on* by pressing the ON/OFF switch, located on the left side of the power module at the rear of the instrument, to the ON position. The green "Power" light will illuminate, the fan will start, and the conveyor spirals will begin to slowly revolve.

**NOTE:** When the HEMA-TEK® Stain Pak contains sufficient reagents to stain only about 20 slides, the red "Low Stain" light will illuminate to indicate the need for replacement of the Stain Pak (refer to "Stain Pak Replacement" in this section).

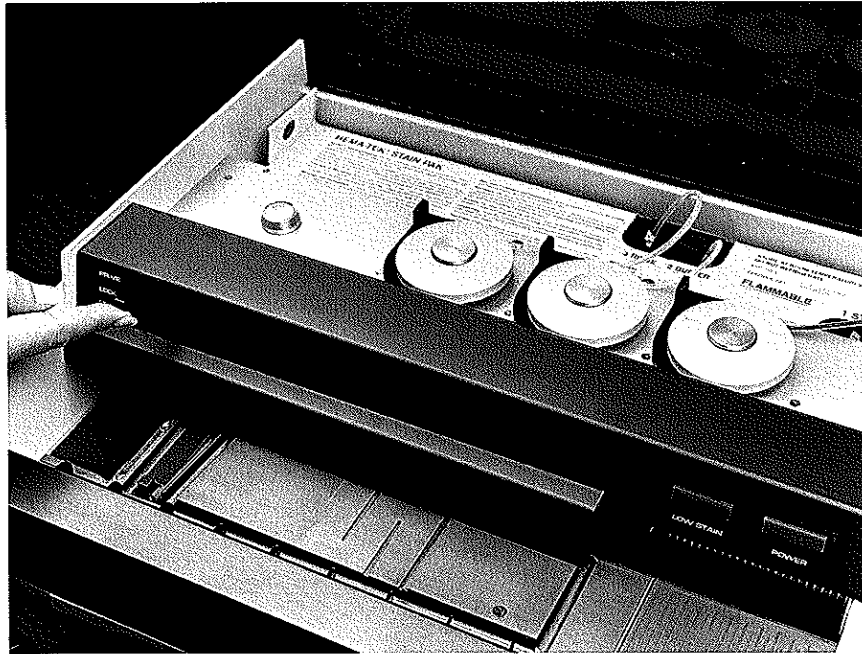


Figure 3-1  
Priming the Tubing

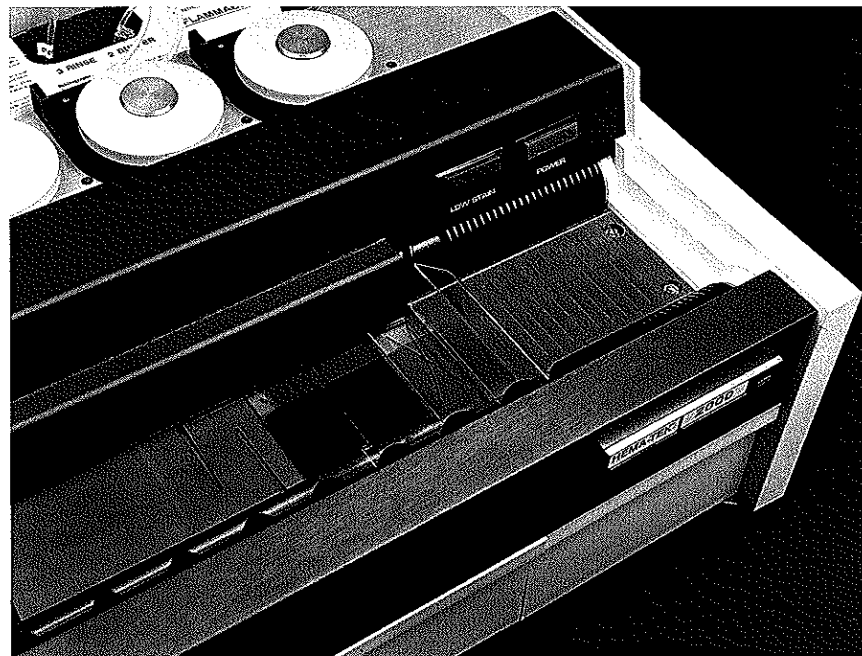


Figure 3-2  
Priming the Platen



## STEP 2 PRIME THE TUBING

Lift the operating lever to the top position (PRIME) (Figure 3-1) and hold in this position until the stain, buffer and rinse reagents all flow evenly through their tubes to the platen without any air bubbles. Release the lever, which will return automatically to the LOCK position.

**NOTE 1:** After priming, wipe the platen with a soft lint-free absorbent cloth or tissue. **Wipe from right to left only.**

**NOTE 2:** If the tubing is new and does not prime easily, it may be necessary to assist the priming initially. Continue holding the operating lever in the PRIME position and push the pump arm *inwards* (toward the pump) until the reagent fills the tubing, then release the pump arm. It may also be helpful to pinch the tubing several times with the fingers, pinching in the area between the cannula and the pump.

## STEP 3 LOAD THE BLOOD SMEAR SLIDES

**CAUTION:** Whenever handling blood or blood products, the user should follow the recommendations for prevention of blood-borne transmissible diseases in health care settings, issued by The U.S. Public Health Service, Centers for Disease Control.

### a. Prime the Platen

The platen should be primed and wetted with reagents in order to ensure optimal results on the specimen slides. This is accomplished by loading 2-4 slides (blank or old blood smears) and allowing these to be transported across the platen ahead of the patient slides (Figure 3-2). These priming slides should be clearly identified as such (for example, by marking a large "X" across the back side of the slide) and can be reused for this purpose.

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

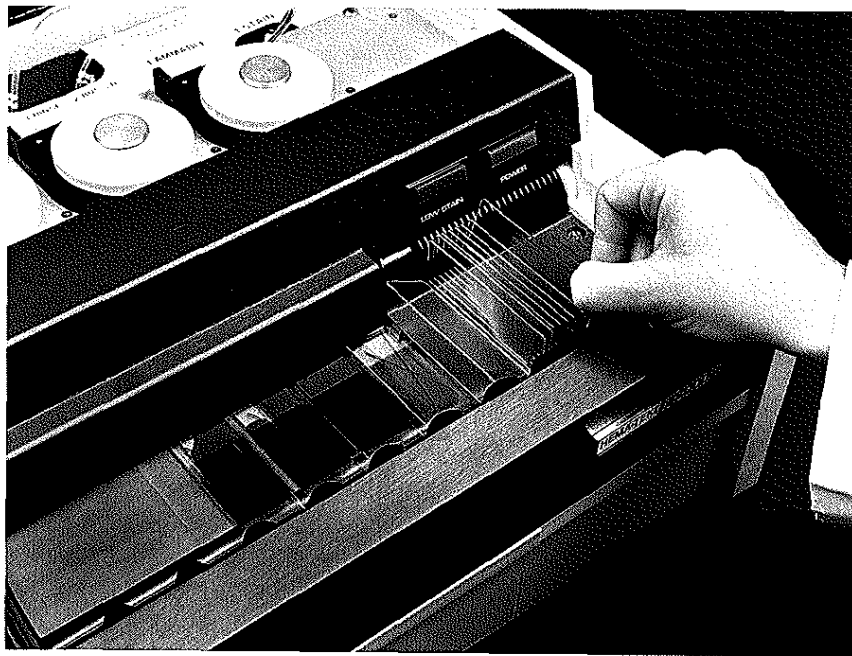


Figure 3-3  
**Loading the Blood Smears**

**b. Load the Patient Slides**

Immediately following the priming slides, place the properly prepared patient blood smears into the grooves of the conveyor spirals (Figure 3-3). The side with the blood smear must face to the *left* of the operator. Place the slide so the feathered edge of the blood smear is toward the *back* of the instrument.

**STEP 4 STAIN THE SMEARS**

The slides will be moved along the platen, first vertically, then horizontally with the blood smear side down. When the slide contacts the first sensing switch and the pump is activated, stain flows from the stain orifice, filling the capillary space between the platen and the slide. This is 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 and delivered into the slide drawer, ready for examination.

**NOTE 1:** If the reagents overflow, rather than just fill, the capillary space between the platen and slide, or if you obtain improper staining results, the reagent pumps may need adjustment (refer to Section 8, Part E, for instructions).

**NOTE 2:** If the instrument is accidentally unplugged or there is a power failure during operation, it may be necessary to remove the slides on the platen and reprocess them.

**STEP 5 CLEAN THE TUBING AFTER USE**

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 recommended the stain tubing be cleaned with methanol (as described in Section 6, "Daily Cleaning — Stain Tubing and Cannula"). The operating lever should also be pushed down to the UNLOCK position to relieve the pressure against the pump tubing. Repriming of the tubing and the platen will then be necessary.

- 
- STEP 6** TURN THE INSTRUMENT *OFF* AT THE END OF THE DAY  
At the end of the day, clean the platen and stain tubing, and empty the waste tank. Push the operating lever to the UNLOCK position and turn the instrument power *off*.  
**IMPORTANT:** Always clean the instrument after daily use. See Section 6, "Daily Cleaning." If using frosted-end slides, it is especially important that the front guide rail be cleaned on a regular and frequent basis. This is because the stain may wick across the frosted portion of the slide to the front rail; if allowed to accumulate, slide breakage may occur.

### **Stain Pak Replacement**

If the "Low Stain" light illuminates when the instrument is first turned *on* or while slides are being processed, a new HEMA-TEK Stain Pak is needed. Replace as instructed below.

- STEP 1** Remove the three cannulas from the used Stain Pak and lift the empty carton out of the well at the rear of the instrument.
- STEP 2** Insert a new HEMA-TEK Stain Pak carton into the well, with the STAIN bottle to the right. Make sure the carton is all the way down and resting on the tray at the bottom of the well. The carton should be level when properly installed.
- STEP 3** Remove the perforated tabs on the new Stain Pak carton. Vent each bottle and insert the cannulas, as described in Section 2, Step 5-b.  
**NOTE:** Check the cannulas with each new Stain Pak and replace them if they appear bent or damaged.
- STEP 4** Empty the waste tank into an appropriate receptacle and rinse it with water after each Stain Pak replacement (see Section 6, "Daily Cleaning — Waste Tank").

**IMPORTANT:** After replacement of the Stain Pak, the instrument must always be primed to remove any air bubbles that develop in the tubing during the changeover.

## SPECIMEN PREPARATION

### Types of Specimens

The HEMA-TEK® 2000 Slide Stainer is designed specifically for the automatic staining of peripheral blood smears that have been prepared on standard 25mm x 75mm or 1" x 3" slides. Blood smears that are stained according to instructions (see Section 3) will provide the examiner with high quality differential staining characteristics for all cytologic blood components.

**CAUTION: Whenever handling blood or blood products, the user should follow the recommendations for prevention of blood-borne transmissible diseases in health care settings, issued by The U.S. Public Health Service, Centers for Disease Control.**

### Blood Smear

It is crucial to start out with a properly prepared blood smear in order to obtain the best results on the stained slide. The following suggestions are recommended:

1. Use high quality slides that are new and thoroughly cleaned. Slides must be free of oil and grease. Do not touch the slide surfaces with the fingers; do not touch the slide against the skin of the patient.
2. The blank slides should be protected from moisture and high humidity, as well as contamination by dust, flies, and other insects. Store the slides covered in a cool, dry place.
3. Keep blood smears away from excessive heat such as radiators or ovens; protect the smears from water splatters and high humidity.
4. Never use oxalated or heparinized blood for making blood smears. EDTA is the anticoagulant of choice.
5. Never squeeze the area around the puncture site to obtain the blood; rather, "milk" the area above the site to bring the blood down to the puncture. Wipe off the first drop or so of blood before collecting the drop for the smear. The blood obtained should be freely flowing from the skin puncture.

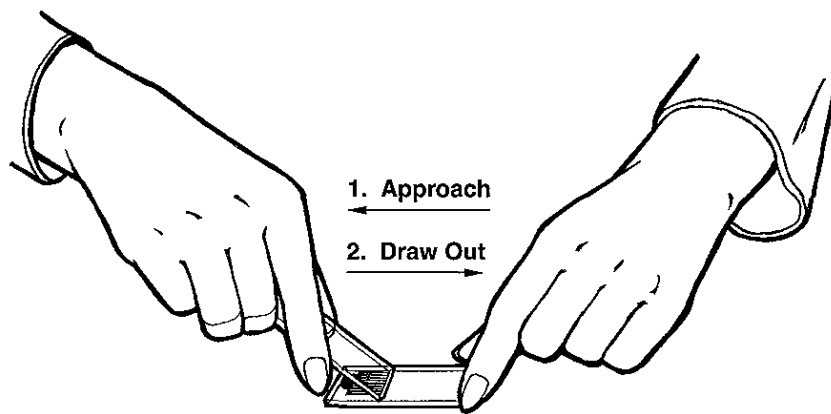


Figure 4-1  
**Making a Blood Smear**

6. Pick up a small drop of blood with the slide (do not touch the slide to the skin) so it is about  $\frac{1}{2}$  inch from the end of the slide. Approach the drop with another slide at about a  $30^\circ$  angle. Allow the blood to run across the edge of the spreader slide, then push the spreader slide forward with a steady even motion, as illustrated in Figure 4-1. Observe the following precautions when making the smear:
  - a. The feathered edge of the smear should end at least  $\frac{5}{8}$  inch from the opposite end of the slide; any portion of the smear that extends beyond this point will not be in contact with the platen surface and the staining reagents.
  - b. If the smear touches the edges of the slide, large cells may tend to accumulate in groups at the edges, and small cells, such as lymphocytes and nucleated RBCs, may move to the center. The result is a mechanically distorted representation of the blood specimen.

**NOTE: If using slides with coated ends (e.g., Superfrost™/Colorfrost™) or frosted ends, extra care must be taken in preparing the smear, as the space remaining on which to spread the blood is considerably less than on clear slides.**
7. Do not use too large a drop of blood or the smear will be too thick. Do not draw out the drop too rapidly or, again, the smear will be thick and will not extend as far along the slide as it should.
8. Allow the smear to *thoroughly* air dry. Stain with the HEMA-TEK 2000 Slide Stainer, using the HEMA-TEK® Stain Pak according to operating instructions (see Section 3). Examine as soon as possible.
9. Keep the stained slides out of direct sunlight. Store the slides in a cool, dry place.

---

## Specialized Usage of HEMA-TEK System

Although the major function of the HEMA-TEK Slide Stainer and Stain Pak is to stain conventional blood smears on glass slides, certain specialized uses have evolved.

*Staining of Bone Marrow Slides:* Many laboratories stain bone marrow smears with the same stain as is used for blood smears. The procedure involves using the “squash” technique for smear preparation and staining the slide once or twice on the HEMA-TEK Slide Stainer. The following procedure has been verified as giving clinically useful staining results on bone marrow slides; however, the stain quality is dependent upon the thickness and evenness of the bone marrow smear. A thick smear is more likely to require a second pass through the instrument than a thinner smear; an uneven smear will not stain uniformly.

1. Use bone marrow smears that have been prepared using the “squash” technique. Be sure the smear is thoroughly dry before staining.
2. Place the slide onto the HEMA-TEK Slide Stainer and stain in the normal fashion.
3. Remove the slide after it has been stained and examine it under high power (dry) for the staining quality. *Do not use any oil on the slide for this examination.*
4. If the slide is understained, place it on the Slide Stainer again and stain it a second time (in rare instances, a third staining may be necessary).
5. a. **When using the HEMA-TEK® Modified Wright Stain Pak (#4481):**  
*In general, the bone marrow smears must be stained twice; one pass through the instrument is generally insufficient to produce distinct nuclear intensity. A third pass generally does not increase or decrease the quality of the staining.*



b. **When using the HEMA-TEK® Modified Wright-Giemsa Stain Pak (#4405):**

*In general*, a single staining is sufficient for most bone marrow smears. The smear may become overstained, with the appearance of precipitate and nuclear artifacts, on slides stained two or more times.

6. Thoroughly clean the platen after staining bone marrow slides to remove the greasy residue that can be left on the platen by the fat droplets in the marrow.



Figure 5-1  
HEMA-TEK® Stain Paks



Figure 5-2  
HEMA-TEK® Cannula and Tubing Sets

**ACCESSORIES**

(Refer to Figures 5-1 and 5-2)

**HEMA-TEK® Stain Pak— Modified Wright's Stain ①**

To obtain the best results with the HEMA-TEK® 2000 Slide Stainer, the HEMA-TEK® Stain Pak (Product No. 4481) should be used. The Stain Pak contains a polychrome methylene blue stain and specially prepared buffer and rinse solutions. The Stain Pak is contained in a single carton that fits easily into the well inside the Slide Stainer. Each Stain Pak contains sufficient solutions to stain approximately 1000 blood smears.

**HEMA-TEK® Stain Pak— Modified Wright-Giemsa Stain ②**

This HEMA-TEK® Stain Pak (Product No. 4405) is a modified Wright-Giemsa stain for laboratories that prefer a Giemsa stain component for preparation of their blood smears. The Wright-Giemsa Stain Pak contains a modified polychrome methylene blue-eosin stain based on the original stain proposed by Romanowsky. Also supplied are buffer and rinse solutions that have been optimally designed for use on the HEMA-TEK 2000 system.

**HEMA-TEK® Cannula Set ③**

The HEMA-TEK® Cannula Set (Product No. 4483) is available as a replacement item. The cannulas are positioned in the Stain Pak bottles and connected to the pump tubing. Only these cannulas should be used with the instrument.

**HEMA-TEK® Pump Tube Set ④**

The HEMA-TEK® Pump Tube Set (Product No. 4482) consists of three tubes, each labeled with an identifying number specific to the reagent to be carried in the tubing. Each tube is of a specific diameter and length to ensure precise measurement of the reagents. The tubing is made of a special type of rubber that is resistant to leaching and brittleness. Only HEMA-TEK Pump Tubes should be used with the HEMA-TEK 2000 Slide Stainer.

**HEMA-TEK® Underplaten Tubing ⑤**

The HEMA-TEK® Underplaten Tubing (Product No. 4484) is also available for periodic replacement. The tubing set consists of three tubes of equal diameter and length and therefore are not specific to a reagent.

## CARE OF THE INSTRUMENT

The HEMA-TEK® Slide Stainer is a precision instrument, designed to provide trouble-free operation with a minimum of maintenance. If given reasonable care, the instrument will require little attention.

**CAUTION: When cleaning this instrument, the user should follow the recommendations for prevention of blood-borne transmissible diseases in health care settings, issued by The U.S. Public Health Service, Centers for Disease Control.**

### General Cleaning

Keep the exterior of the instrument free of dust at all times. If needed, the exterior may be cleaned using a damp cloth and a mild detergent. A small amount of absolute methanol may be used to clean stain from the cabinet or the clear plastic lid.

### Daily Cleaning

It is vitally important to clean the platen and tubing at least once each day in order to maintain consistently high quality staining results.

### Platen

After staining a large number of blood smears, precipitated stain solution tends to accumulate in the mixing grooves of the platen. This precipitate must be removed at regular intervals. Daily cleaning of the platen is imperative; after each run is optimal. Cleaning is especially important if bone marrow slides have been stained because the fat droplets can leave a greasy residue on the platen. Clean the platen as follows:

1. Turn the instrument *off*, then carefully flood the working area of the platen with absolute methanol. **Avoid splashing the methanol.**



Figure 6-1  
Cleaning the Platen

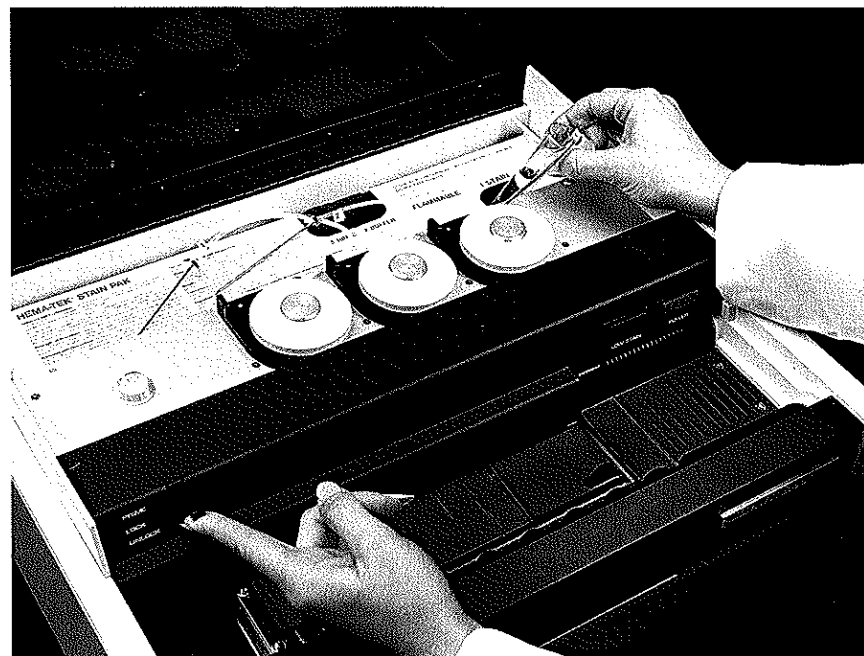


Figure 6-2  
Rinsing the Stain Tubing

2. Using a soft, disposable tissue, wipe the platen clean. Carefully wipe from *right to left only*, taking care not to scratch the platen (Figure 6-1). Be sure the mixing grooves and the front guide rail are thoroughly cleaned. If using frosted-end slides, it is especially important that the front guide rail be kept clean. This is because the stain may wick across the frosted portion of the slide to the front rail; if allowed to accumulate, slide breakage may occur.  
**CAUTION: Wipe from right to left only — damage to the position or shape of the sensing switch fingers may result from careless cleaning practices. Check the position of the fingers after cleaning, as directed in Section 8, Part E, Step 6.**

### **Stain Tubing and Cannula**

The tubing carrying the stain should be cleaned at least once daily (or after each run), as described in the following procedure:

1. Remove the stain, buffer, and rinse cannulas from the HEMA-TEK Stain Pak bottles.  
**NOTE:** The buffer and rinse cannulas and tubing do not require cleaning. These cannulas are removed so the buffer and rinse solutions are not wasted while the stain tubing is being cleaned.
2. Place the stain cannula, with tubing attached, into a small container of methanol and lift the operating lever to PRIME (Figure 6-2). Holding the lever in this position, continue to pump methanol through the stain tubing until it is thoroughly rinsed (clear solution appears on the platen). Carefully wipe the methanol from the platen with a soft, disposable tissue. **Wipe from right to left only.**
3. After the stain tubing has been cleaned, remove the cannula from the methanol and continue to prime until the tubing is emptied of all solution.

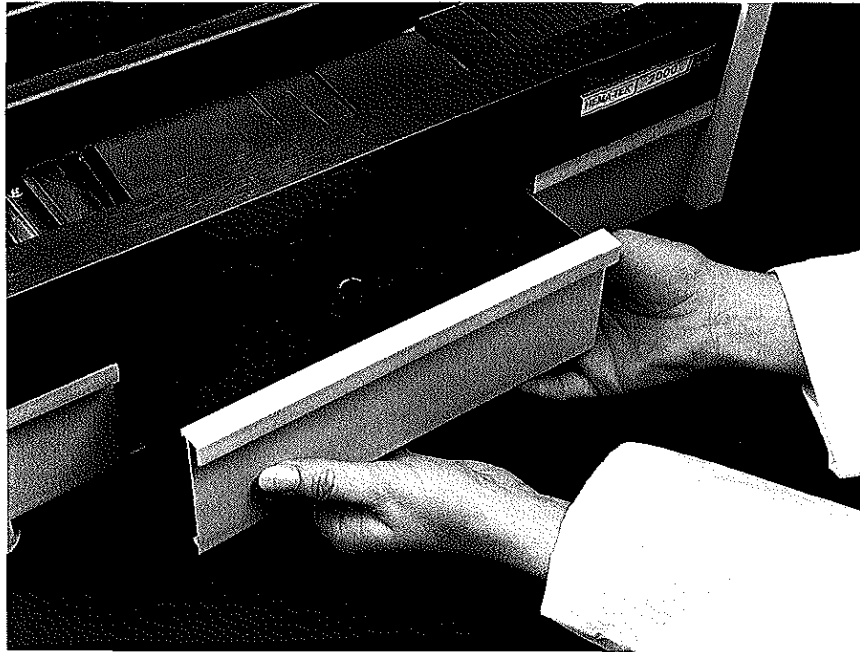


Figure 6-3  
Removing the Waste Tank

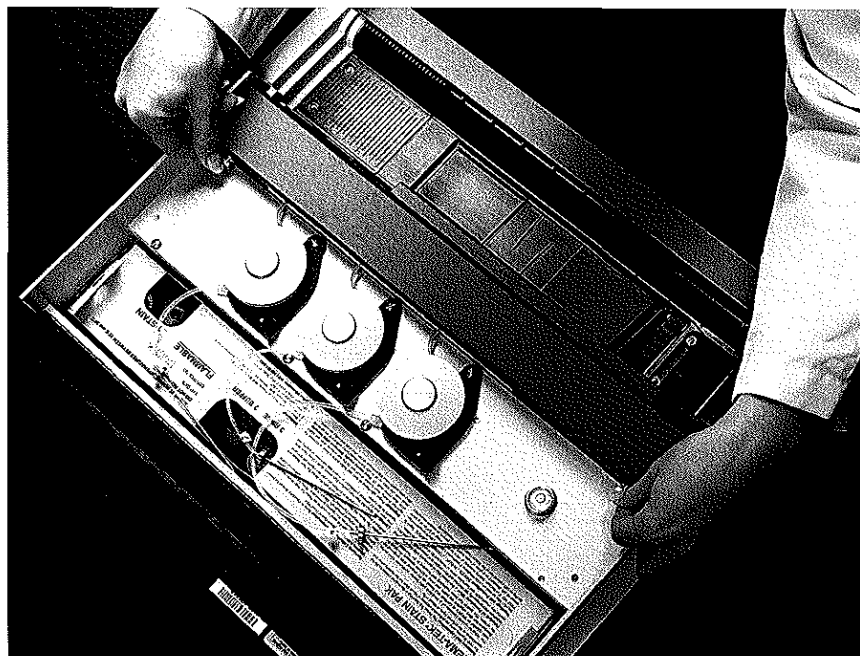


Figure 6-4  
Location of Thumbscrews

## Waste Tank

The waste tank should be emptied once each day, as well as after installing a new Stain Pak. To avoid spilling the contents while emptying the waste tank, carefully pull the tank away from the instrument, supporting the bottom of the tank to hold it level during removal (Figure 6-3). After emptying into an appropriate receptacle, rinse the waste tank with water and replace it into the instrument.

## Periodic Cleaning

### Drain Troughs

The back and front drain troughs of the HEMA-TEK 2000 Slide Stainer function as drains for excess stain, and residues from the reagents may accumulate and interfere with proper drainage. The troughs, as well as the rear guide rail, should be carefully cleaned on a weekly basis. The recommended procedure for proper cleaning is as follows:

1. **Turn the instrument off and remove the line cord from the AC electrical outlet.**
2. Raise the clear plastic lid on the instrument.
3. Loosen the two thumb screws that are inserted through the notches in the back of the circuit board cover (Figure 6-4). Carefully raise the circuit board cover so the back trough is completely exposed and easily accessible (Figure 6-5). Move the panel up and back, out of the way, until cleaning is completed.  
**NOTE:** The circuit board cover is connected to the instrument by the two connectors of the "Low Stain" and "Power" lights. Rotate the panel carefully so the connectors are not pulled loose.
4. Flood both the front and back troughs with absolute methanol to loosen any precipitated stain that may be present. **Take care not to splash methanol onto the circuit board.**





Figure 6-5  
**Raising the Circuit Board Cover**

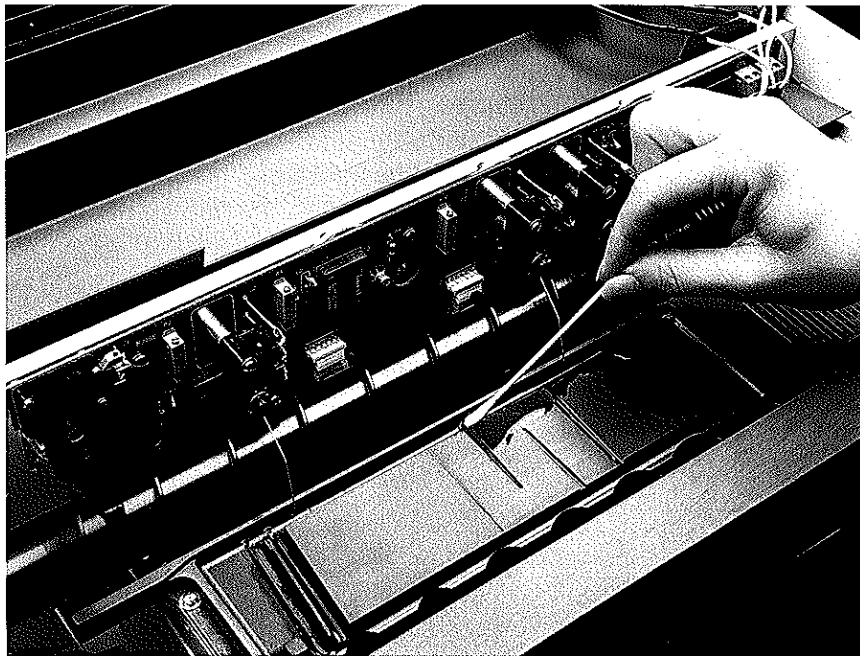


Figure 6-6  
**Cleaning the Back Trough**

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 (Figure 6-6). Do the same in the front trough. Other exposed areas that might be accidentally stained, including the rear guide rail, should be cleaned in the same careful manner. **NOTE:** Care should be taken not to scratch the platen surface.
6. Return the circuit board cover to its normal position (which is between the circuit board panel and the back edge of the screws) and tighten the two thumb screws. Be sure the panel is not resting on top of the screw heads before tightening.

## TROUBLESHOOTING

### Checklist for Quality of Blood Smears

When stained blood smears do not have the desired quality, the first tendency is to assume the staining reagents or the stainer is at fault. Frequently, however, other factors are the cause of the poorly-stained blood smears. The following checklist may be helpful in isolating the problem when the quality of stained blood smears is questioned.

- Are the pump volumes properly adjusted? Improper settings may lead to poorly stained blood smears. (See Section 8, Part E.)
- Is the blood old or does it contain an incorrect anticoagulant? Fresh blood (less than 2-3 hours old) should be used; EDTA is the anticoagulant of choice.
- Was the blood thoroughly mixed before making the smear?
- Is the blood smear too thick, too thin, or spread unevenly?
- Does the feathered edge of the smear end at least  $\frac{5}{8}$  inch from the end of the slide?
- Was the blood smear thoroughly dry before staining?
- Are the slides clean? Even new slides are not necessarily clean.
- Are the slides flat? Warped slides will stain unevenly.
- Have the HEMA-TEK® Stain Pak containers been vented? Venting is necessary for even delivery of the stain, buffer and rinse reagents.
- Has the reagent tubing on the HEMA-TEK® 2000 Slide Stainer been primed before staining the slides? Air bubbles in the tubing will cause poorly stained smears.
- Has the platen been primed and wetted before running blood smears? Two to four blank slides should be processed across the platen to wet the platen surface prior to each run of blood smears.
- Is the stain tubing, cannula, nipples, or orifice plugged? Daily cleaning of the stain tubing is recommended to prevent plugging. (See Section 6, "Daily Maintenance.")
- Are the platen and grooves clean and free of residue? A dirty platen or grooves will result in uneven, low-quality staining.
- Is the microscope clean and adequately illuminated? A dirty microscope or inadequate lighting may give the impression of a poorly stained blood smear.

---

## **Troubleshooting Information**

The following Instrument Troubleshooting Chart lists possible problems relating to electrical and mechanical operations that could occur during instrument operation. Probable causes and recommended remedies are also included, so that many isolated problems can be quickly corrected. When dealing with any problem with the HEMA-TEK 2000 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 additional assistance is required concerning an instrument problem, complete the "Preservice Checklist" in Section 9, SERVICE AND REPLACEMENT PARTS, then contact the Customer Service Department of Miles Inc., Diagnostics Division by calling toll free 1-800-348-8100 (continental U.S. only). If located outside the United States, contact the nearest HEMA-TEK® instrument distributor or representative for information and assistance.

Only HEMA-TEK Stain Paks should be used with the HEMA-TEK 2000 Slide Stainer; do not use any other stain solution. For problems or questions concerning the Stain Paks, contact the Customer Service Department. If the problem cannot be isolated or is beyond the scope of this manual, contact the Customer Service Department.

## INSTRUMENT TROUBLESHOOTING CHART

| Problem   | Probable Cause  | Remedy   |
|---|---|--|
| Unit fails to turn <i>on</i> when instrument is turned ON.                      | <ol style="list-style-type: none"> <li>1. Power cord is not plugged into wall outlet or instrument.</li> <li>2. Line fuse is blown.</li> <li>3. Fuse blown or circuit breaker tripped in electrical circuit of building.</li> <li>4. Instrument electrical failure.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Plug power cord in.</li> <li>2. Unplug the unit and replace fuse. See Section 8, Part A.</li> <li>3. Have fuse replaced or circuit breaker reset.</li> <li>4. Contact Customer Service.</li> </ol>   |
| Green "Power" light fails to illuminate but drive, pump and fan motors operate. | <ol style="list-style-type: none"> <li>1. Light is burned out.</li> <li>2. Open circuit in associated wiring.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Replace light assembly. See Section 8, Part D.</li> <li>2. Contact Customer Service.</li> </ol>  |
| Pumps run but do not deliver solution during or after priming.                  | <ol style="list-style-type: none"> <li>1. Stain Pak is empty or nearly so.</li> <li>2. Tubing has accidentally been pulled off platen nipple.</li> <li>3. Cannula openings are obstructed with debris.</li> <li>4. Pump tubing is collapsed from use, or is perforated.</li> <li>5. Underplaten tubing (from the circuit board area to the platen) is clogged with foreign matter.</li> </ol> | <ol style="list-style-type: none"> <li>1. Replace with a new Stain Pak. See Section 3.</li> <li>2. Place tubing back on nipple.</li> <li>3. Remove cannulas from solution bottles and clean away any debris with cloth and alcohol.</li> <li>4. Replace pump tubing. See Section 8, Part B.</li> <li>5. Replace with new tubing. See Section 8, Part C.</li> </ol> |

## INSTRUMENT TROUBLESHOOTING CHART

| Problem  | Probable Cause  | Remedy   |
|--|---|--|
| Red "Low Stain" light is not functioning properly.         | <ol style="list-style-type: none"> <li>1. Stain Pak is not properly positioned in well.</li> <li>2. Light is burned out.</li> <li>3. Light switch is not operating correctly.</li> <li>4. Switch or associated circuit is defective.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Rearrange the Stain Pak so it moves freely up and down on the right end.</li> <li>2. Replace the light assembly. See Section 8, Part C.</li> <li>3. Contact Customer Service for information on adjusting the switch.</li> <li>4. Contact Customer Service.</li> </ol> |
| Improper mixing action between stain and buffer on platen. | <ol style="list-style-type: none"> <li>1. Instrument is not properly leveled.</li> <li>2. Inadequate pump volume setting.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Adjust the front feet of the instrument so the bubble is centered in the circular level. See Section 2, INSTALLATION.</li> <li>2. See Section 8, Part E. Contact Customer Service if unable to adjust properly.</li> </ol>   |
| Uneven staining.   | <ol style="list-style-type: none"> <li>1. Mixing grooves on the platen are dirty.</li> <li>2. Too much solution is being pumped, causing poor mixing of stain and buffer.</li> <li>3. Warped slides.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Clean the mixing grooves. See Section 5, "Daily Cleaning — Platen."</li> <li>2. See Section 8, Part E.</li> <li>3. Replace the slides.</li> </ol>  |
| Pale staining.   | <ol style="list-style-type: none"> <li>1. Proper stain-to-buffer ratio has not been achieved.</li> <li>2. Stain volume is adjusted too high. Increasing stain volume may decrease stain intensity.</li> <li>3. Rinse volume is too high.</li> <li>4. Deteriorated or outdated Stain Pak.</li> </ol> | <ol style="list-style-type: none"> <li>1. See Section 8, Part F.</li> <li>2. See Section 8, Part E.</li> <li>3. See Section 8, Part F.</li> <li>4. Replace the Stain Pak.</li> </ol>   |

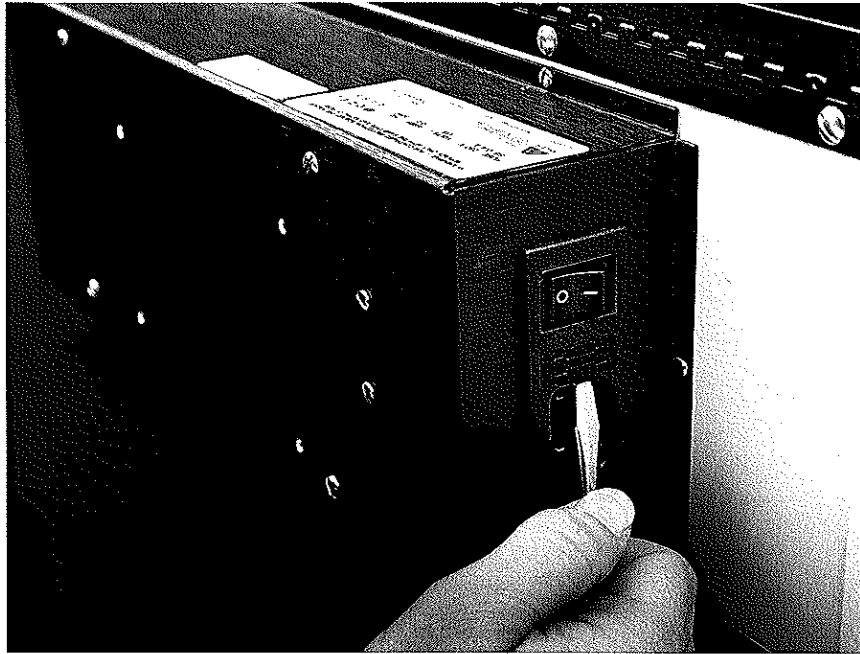


Figure 8-1  
**Opening the Fuse Cover**

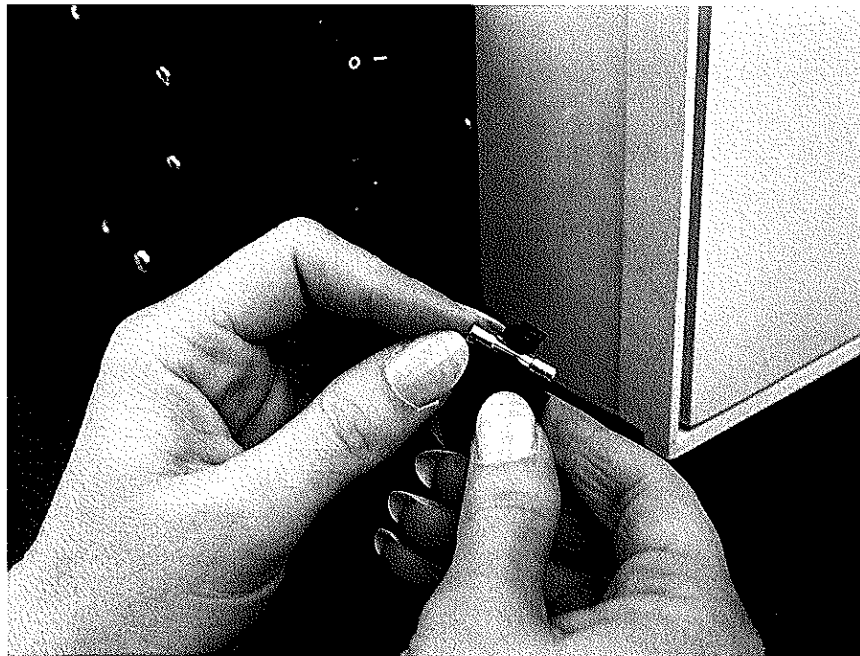


Figure 8-2  
**Replacing the Fuse**

## MINOR REPAIRS, MAINTENANCE, AND ADJUSTMENTS

This section is provided as an aid for performing minor repairs, maintenance procedures, and adjustments on the HEMA-TEK® 2000 Slide Stainer. The procedures must be completely understood before being attempted and then performed with care. For any repairs other than those given in this section, or if any procedure appears to be too complex, refer to Section 9, SERVICE AND REPLACEMENT PARTS, for instructions on service for your instrument.

### A. Fuse Replacement

#### Tools Required:

Small screwdriver (blade type, short)

#### Parts Required:

Instrument Line Fuse —

0.4 amp, 5mm x 20mm, Slo-Blo (Part No. 40151114)  
(for all voltage instruments)

#### Procedure:

1. **WARNING: TURN THE INSTRUMENT OFF AND REMOVE THE LINE CORD FROM THE INSTRUMENT BEFORE REPLACING THE FUSE.**
2. Using a small, short screwdriver, pry the fuse cover open (Figure 8-1). The entire fuse holder will now pull out of the instrument like a small drawer.
3. Remove the fuse from the holder (Figure 8-2) and discard if blown.
4. Replace the defective fuse with an identical type fuse listed above, snapping it into place. A spare fuse, located in the small enclosed compartment in the fuse holder, is shipped with the instrument. Push the fuse out of the compartment using a small screwdriver.  
**CAUTION: Use a fuse of the specified type and amperage rating only.**
5. Replace the fuse holder into the instrument, with the flat side up. Press firmly on the cover until it snaps into place and is flush with the power module plate.



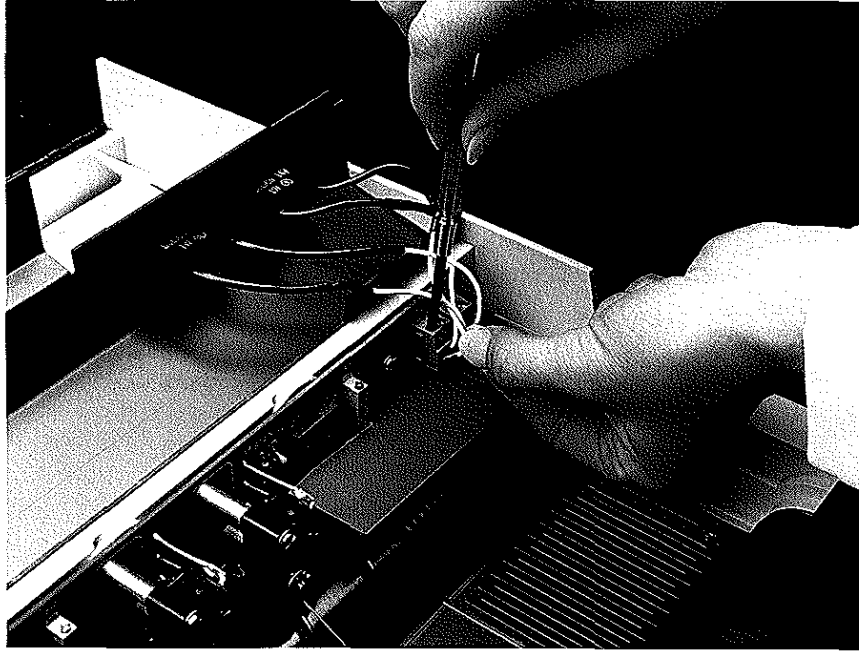


Figure 8-3  
**Removing the Connector Wires**

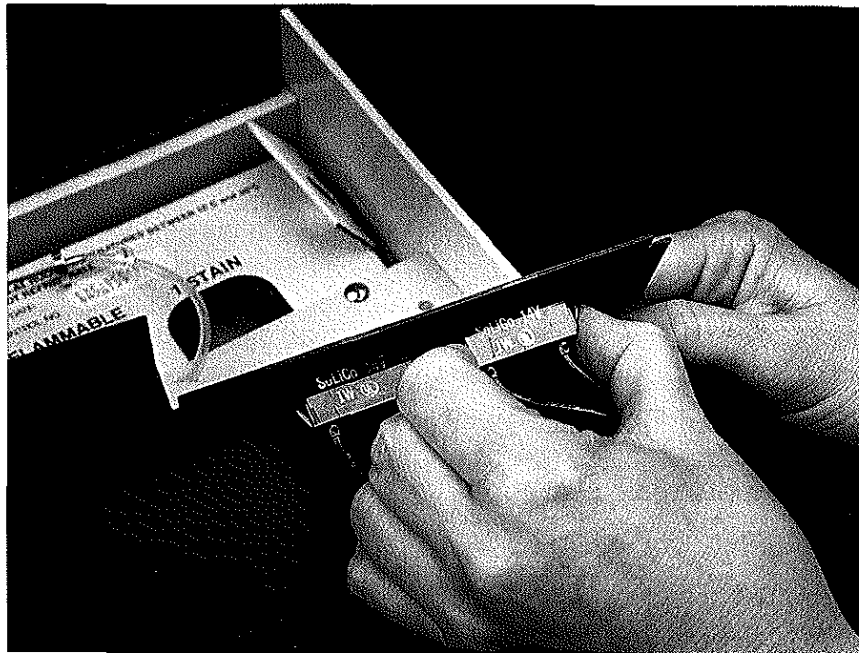


Figure 8-4  
**Unsnapping the Light Assembly**

## **B. Replacement of "Power" or "Low Stain" Light Assembly**

### **Tools Required:**

Small screwdriver (blade type)

### **Parts Required:**

"Power" Light Assembly (green) (Part No. 94000787)

"Low Stain" Light Assembly (red) (Part No. 94000788)

### **Procedure:**

1. **WARNING: TURN THE INSTRUMENT OFF AND REMOVE THE LINE CORD FROM THE AC ELECTRICAL OUTLET.**
2. Raise the clear plastic lid on the instrument.
3. Loosen the two thumb screws at the back of the circuit board cover (refer to Figure 6-4). Lift the panel from the front wall, exposing the printed circuit board and the connectors for the "Low Stain" and "Power" lights (refer to Figure 6-5).
4. Disconnect the wires from the circuit board for the light that is to be replaced. Using a small, blade-type screwdriver, loosen the two small screws located on the top of the connector (the screws will not come out completely), then pull on the connector wires to remove them from the connector (Figure 8-3).
5. Unsnap the burned-out light assembly from the circuit board cover by pinching together the two plastic retaining tabs on the light assembly (Figure 8-4). If the tabs are too stiff, use a screwdriver to press against one side, then push that edge partially through the opening. Repeat with the other side.
6. Insert the new light assembly into the circuit board cover, threading the wires through the opening from the front of the cover and pressing firmly on the light until it snaps into place. Insert the connector wires into the holes on the connector on the printed circuit board (each wire can go into either hole). Tighten the small screws to just past finger tight.
7. Place the circuit board cover over the circuit board and operating lever, locating the notches in front of the thumb screw heads. Tighten the screws. Make sure the panel is not resting on the screw heads before tightening.
8. Replace the line cord into the AC electrical outlet and turn the instrument *on* to check the light operation.

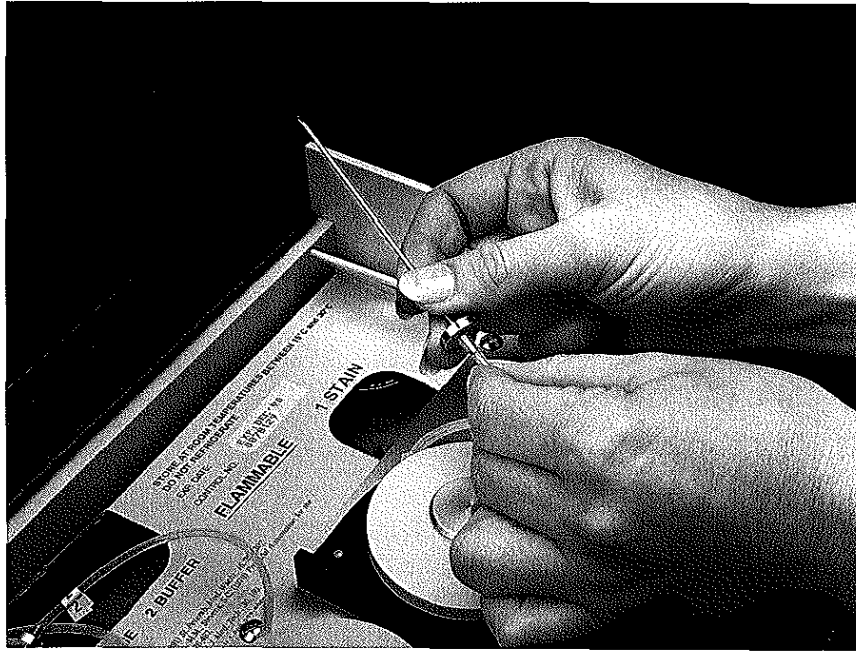


Figure 8-5  
Removing Tubing from Cannula



Figure 8-6  
Removing Tubing from Nipple

## C. 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. Regular flushing of the stain tubing with methanol prolongs the life of the tubing; all pump tubes should be replaced after three Stain Paks have been used. If regular cleaning is not performed, or if usage is very heavy, the tubing should be changed more frequently.

### Tools Required:

None

### Parts Required:

HEMA-TEK® Pump Tube Set (Product No. 4482)

### Procedure:

1. Remove the three cannulas from the Stain Pak.
2. Raise the operating lever to the PRIME position until the reagents are pumped out of the tubes (refer to Figure 3-1).
3. Push the operating lever down to the UNLOCK position.
4. Disconnect each pump tube from its cannula (Figure 8-5) and from the recessed nipple located in the wall in front of the pumps (Figure 8-6).
5. Remove each tube from the pump arm by pushing the thumb tab on the pump arm to the left as far as possible. While holding the thumb tab in this position (Figure 8-7), pull the plastic cuff on the tube until the tube is completely removed from the pump arm. Discard the tube in an appropriate waste container.
6. Remove the new tubes from the HEMA-TEK Pump Tube Set. Each tube is numerically coded to correspond with the numbers shown on the Stain Pak. The stain tube is coded "1," the buffer tube is coded "2," and the rinse tube is coded "3."
7. Attach the coded end of the new tube to its respective cannula (replace the cannula if it appears damaged or bent). Be sure the stain cannula is used only with the stain tubing.

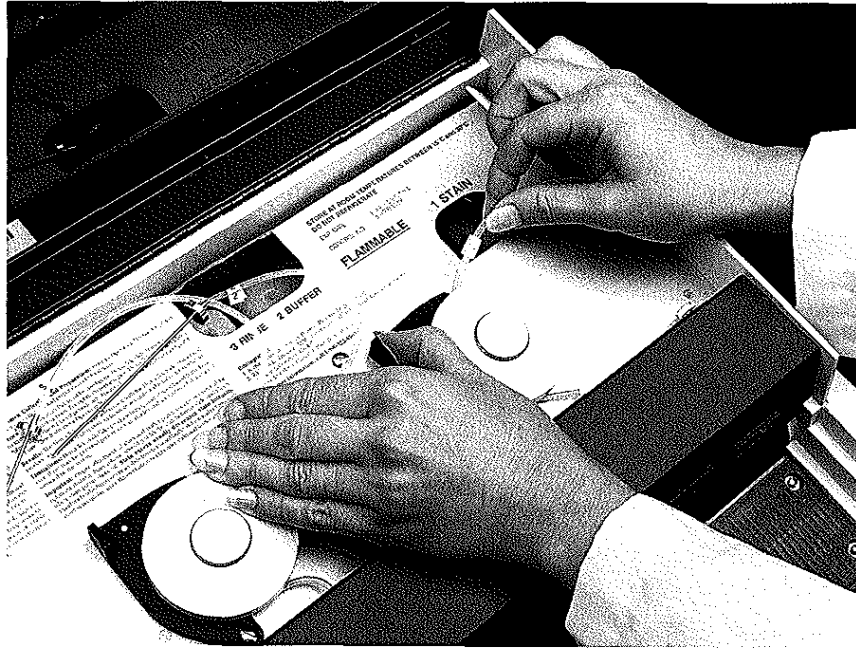


Figure 8-7  
Removing Tubing from Pump Assembly

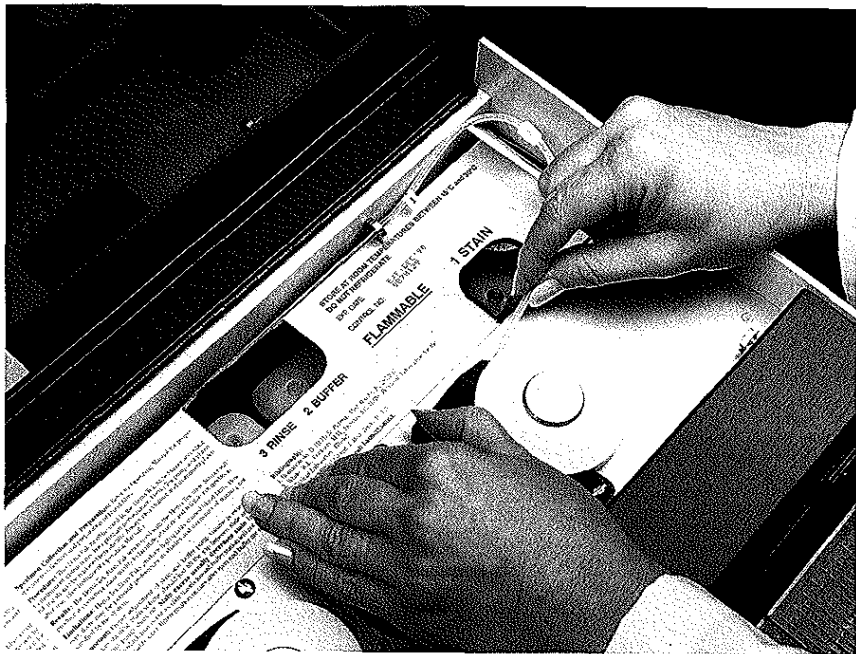


Figure 8-8  
Inserting Tubing into Pump Assembly

8. Extend the new tube to its respective pump and thread the end into the hole in the pump arm. Push the thumb tab to the extreme left as before and push the tube through (Figure 8-8) until the plastic cuff is flush against the pump arm. Release the pump arm.  
**NOTE:** If difficulty is encountered in threading the tubing through the pump housing, lift the 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.
9. Connect the tube to its proper recessed nipple.  
**NOTE:** If difficulty is encountered in connecting a tube to its nipple, use forceps or a hemastat to grasp and attach the tube.
10. Replace the cannulas into their respective reagent bottles. Prime the pumps until the solution in each tube is clear of all air bubbles.  
**NOTE:** New tubing is sometimes difficult to prime the first time and may need assistance. While holding the operating lever in the PRIME position, push the pump arm *inwards* (toward the pump) until the reagent fills the tubing, then release the pump arm. It may also be helpful to pinch the tubing several times with the fingers, pinching in the area between the cannula and the pump arm.
11. Verify the pump timings and reset the volume controls if necessary (see Part E below).

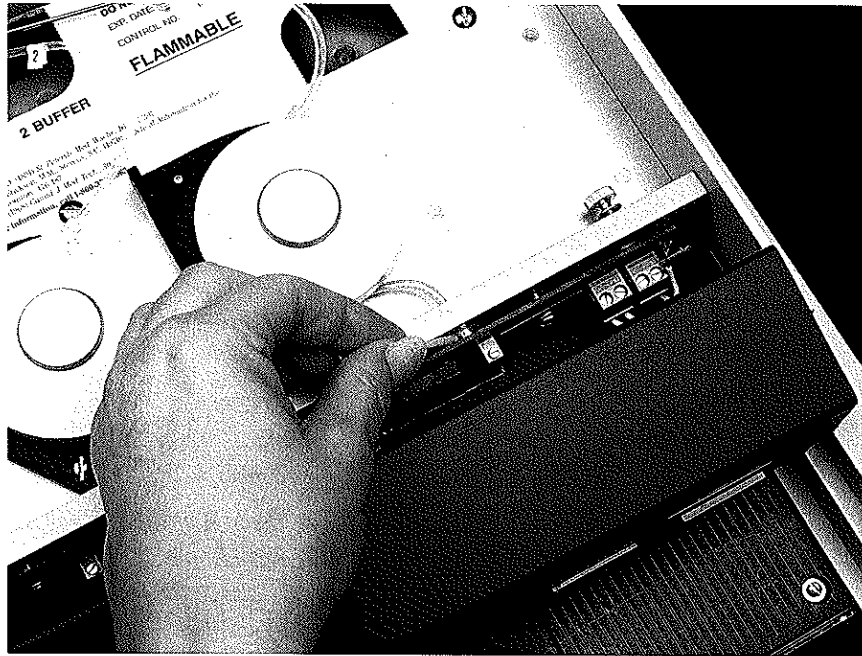


Figure 8-9  
**Disconnecting Underplaten Tubing from Nipple**

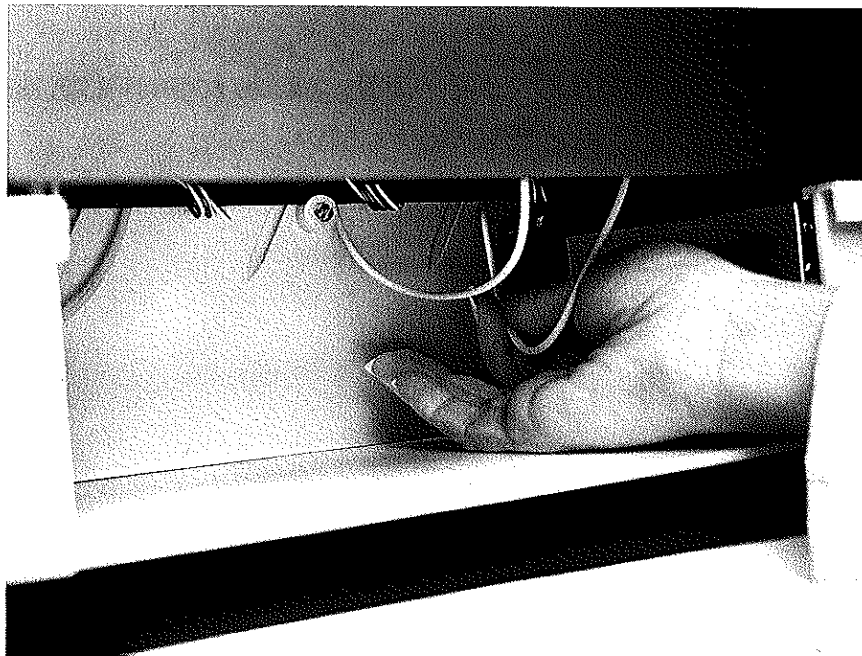


Figure 8-10  
**Removing the Underplaten Tubing**

## D. Replacement of Underplaten Tubing

The underplaten tubing is the tubing between the spout under the platen and the nipple behind the circuit board. The buffer and rinse tubings should be replaced after approximately ten Stain Paks have been used. The stain tubing needs to be changed more frequently, especially if it is not regularly flushed with methanol. Depending on usage and cleaning patterns, the stain tubing may need to be changed as often as after every four Stain Paks.

### Tools Required:

None

### Parts Required:

HEMA-TEK® Underplaten Tubing (Product No. 4484)

### Procedure:

1. Remove the three cannulas from the Stain Pak.
2. Raise the operating lever to the PRIME position until the reagents are pumped out of the tubes (refer to Figure 3-1).
3. **TURN THE INSTRUMENT OFF AND REMOVE THE LINE CORD FROM THE AC ELECTRICAL OUTLET.**
4. Raise the clear plastic lid on the instrument, then loosen the two thumb screws on the back of the circuit board cover. Carefully rotate the panel up and back.  
**NOTE:** The circuit board cover is connected to the instrument by the two connectors of the "Low Stain" and "Power" lights. Rotate the panel carefully so the connectors are not pulled loose.
5. Disconnect the "Low Stain" and "Power" lights from the circuit board, as directed in Step B-4 in this section. Remove the circuit board cover from the instrument.
6. Disconnect the stain tubing from the nipple that is located behind the circuit board (Figure 8-9).
7. Remove the waste tank and reach underneath the platen through the waste tank area. Disconnect the stain tubing from the platen by pulling the tubing free from behind the circuit board (Figure 8-10), then disconnect it from the spout under the platen.



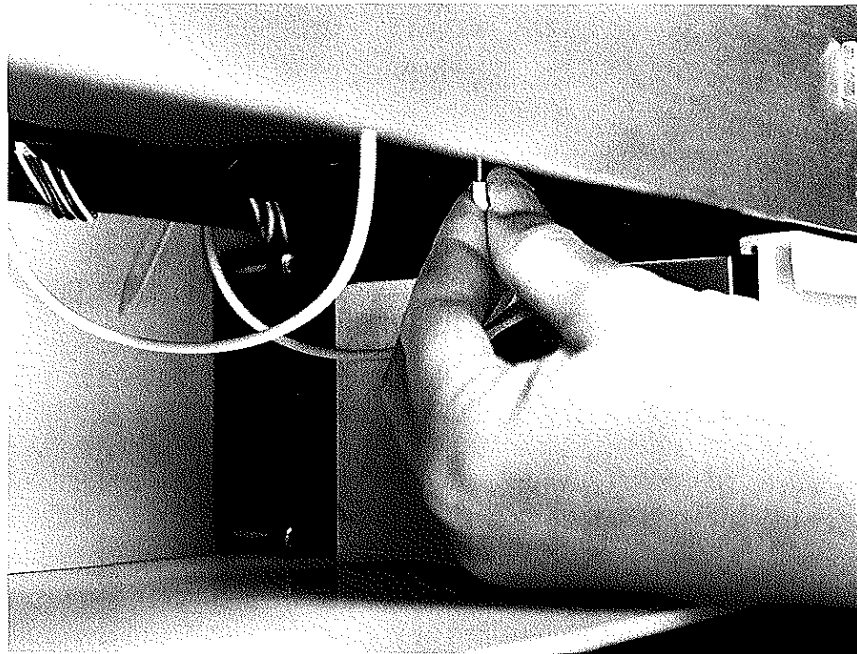


Figure 8-11  
**Connecting Underplaten Tubing to Platen Spout**

8. Select one of the new sections of underplaten tubing and connect it to the stain tubing nipple behind the circuit board. Be sure at least  $\frac{1}{4}$  inch of tubing is connected on the nipple.
9. Thread the tubing behind the circuit board through the channels provided until it extends under the platen.
10. Connect the tubing to the stain spout under the platen (Figure 8-11). Check all connections to make sure the tubing is securely in place.
11. Replace the buffer and rinse tubing in a similar manner as the stain tubing. Connect each tubing section to the appropriate nipple behind the circuit board and then connect the tubing to the appropriate spout under the platen.
12. Place the waste tank back in the instrument.
13. Connect the "Low Stain" and "Power" lights, as instructed in Step B-6 in this section.
14. Install the circuit board cover and tighten the two thumb screws. Be sure the panel is not resting on the screw heads before tightening.

### **E. Pump Volume Adjustment**

The HEMA-TEK 2000 Slide Stainer has been designed to continuously produce stained slides of consistent quality. This is accomplished by having a fixed length of time in each of the three phases (stain, buffer, and rinse), as well as a fixed ratio of stain-to-buffer volumes in the buffer phase.

The stain-to-buffer volume ratio is adjustable to provide ratios of at least 1:2 to 1:3. This feature allows the user flexibility in obtaining the desired stain results. **A small change in the stain-to-buffer ratio can result in either lighter or darker staining.** The amount of reagent pumped in each of the three phases is adjustable through the use of the volume control knobs located in the front control panel.

---

**IMPORTANT:** Complete the maintenance procedures and instrument checks described in Steps 1-6 below *before* making any adjustments to the pump volumes (Step 7).

**STEP 1 REPLACE THE TUBING**

Replace both sets of tubing (i.e., pump tubing and under-platen tubing). Refer to Parts C and D in this section for instructions.

**STEP 2 CLEAN THE PLATEN**

Clean the platen, including the front and back drain troughs, by flooding the platen and troughs with methanol and wiping from *right to left only* (the direction in which the slides travel) with an absorbent tissue, as described in Section 6, CARE OF THE INSTRUMENT. *Care should be taken not to damage the sensing switch fingers.*

**STEP 3 LEVEL THE INSTRUMENT**

The HEMA-TEK Slide Stainer should be level to help provide optimal buffer mixing. This can be verified by observing the circular gauge. If leveling is required, proceed as instructed in Section 2, "Instrument Setup," Step 2.

**STEP 4 CLEAN THE MIXING GROOVES**

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

**STEP 5 VENT THE STAIN PAK**

Ensure that the HEMA-TEK Stain Pak has been vented, as instructed in Section 2, "Instrument Setup," Step 5.

STEP 6 CHECK ADJUSTMENT OF THE SENSING SWITCH FINGERS  
**CAUTION: Careless cleaning practices may force the sensing switch fingers out of adjustment.**

Visually check the adjustment of the switch fingers to ensure they are activating the pumps at the proper time. Observe several slides as they move across the platen. The stain pump should be activated after approximately  $\frac{1}{2}$  of the slide width has passed over the stain orifice. The buffer pump should be activated after about  $\frac{1}{8}$  inch of the slide has crossed over the buffer orifice. And the rinse pump should be activated just as the leading edge of the slide crosses over the rinse orifice.

If the starting times for each pumping phase are not correct, refer to Part G in this section for instructions on adjusting the sensing fingers. If, after adjusting the fingers, the starting times are still not correct, contact the Customer Service Department.

If the sensing fingers are properly adjusted and the reagent volumes are still not correct, proceed with the remaining steps of this procedure.

STEP 7 ADJUST THE STAIN AND BUFFER VOLUMES

Optimal staining results are achieved when the HEMA-TEK 2000 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 the surface of the platen. If the proper amounts of stain and buffer are being pumped, proper mixing of the reagents will occur, resulting in uniform staining of blood slides. Proper adjustment is achieved by the following procedure:

- a. **Locate the pump volume control knobs.** The pump volumes are controlled through the use of the volume control knobs, which are located in the control panel on the front right corner of the instrument. There is a centering catch on each knob, which provides a central reference point. The instrument is manufactured to give a stain-to-buffer ratio of approximately 1:2.5 and a rinse volume of approximately 1.0 mL/slide when each knob is at the centering catch. Volumes are lowest when the knob is turned fully counterclockwise; full clockwise adjustment results in the highest volumes.
- b. **Prime the instrument** 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). Wipe the platen after priming, wiping **from right to left only**.
- c. **Prime the platen.** To achieve the proper surface tension across the platen, run five blood smear slides (either blank or old blood smears) over the platen. This procedure primes and wets the platen to achieve proper surface tension characteristics.
- d. **Adjust the stain volume first.** Immediately following the priming slides, run five blood smear slides across the platen. Adjust the stain control knob so the stain just fills, but does not overflow, the capillary space between the platen and the slide. If the slide is receiving an inadequate amount of stain, adjust the control knob clockwise. 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; if this is occurring constantly, adjust the control knob counterclockwise.

**NOTE:** Occasional small voids may occur on the slide after proper filling; these are acceptable and will not adversely affect stain quality. Do not try to compensate for small voids by increasing the stain volume; doing so may upset the optimum stain-to-buffer ratio and may affect the stain intensity.

As soon as a proper fill has been obtained on two consecutive slides, continue with Step e.

- e. **Adjust the buffer volume next.** Reprime the platen with three blank slides if there has been a gap of more than two consecutive slides across the platen since completion of the previous step. Then add additional blood smear slides to the conveyor spiral.

When a slide passes the buffer section of the platen, mixing of the stain and buffer occurs because of the mixing grooves. This is where the proper stain-to-buffer ratio is most important. The slides should appear under-filled as they travel over the mixing grooves because the capillary gap is slightly greater. *Because of these mixing grooves, the proper stain-to-buffer ratio cannot be determined until the slide passes completely over the grooves and onto the smooth portion of the platen, just before the rinse area.*

**NOTE:** As the slide moves along, the buffer should pulse from the buffer orifice and around the two mixing grooves for complete mixing of the stain and buffer. Too much stain and/or buffer will reduce the pulsing action, causing inconsistent staining across the slide. If partial flooding occurs, it should quickly redrain as the slide continues to move across the grooves. Complete flooding of the second groove may indicate an excessive volume of either the stain or buffer.

The buffer control dial should be set so the stain/buffer mixture just fills the capillary space under the slide *at the end of the platen area*, without extending out from either side of the slide.

- 
- f. **Adjust the rinse volume last.** The centering catch on the rinse volume knob should provide approximately 1 mL/slide, which is the minimum recommended volume. Inadequate rinsing will cause excess stain to be left on the slide, which will appear as precipitation under the microscope. Overwashing will cause pale staining. Any change in the rinse setting may cause a slight color change due to the small amount of methanol in the rinse. Observe the slides under the microscope to determine the impact of any volume change.
- g. **Check the adjusted pump volumes.** Prime the platen with three blank slides, then run at least three blood smears to ensure that the capillary spaces between the platen and slide fill completely with stain at the stain area and with stain/buffer mixture just before the rinse area.
- 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. It is important that the capillary space just fills, without overfilling, by the time the pump shuts off.

## F. Volume and Ratio Determination

Once adjustments have been made that appear visually to be giving appropriate volumes, the pump volumes and stain-to-buffer ratio can be determined as follows:

1. Remove the waste tank and disconnect the underplaten tubing leading to the stain, buffer and rinse spouts on the platen. Place the tubing ends into a beaker or other small container, 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 the stain and buffer tubes into separate 10 mL graduated cylinders; place the free end of the rinse tube into a 25 mL graduated cylinder.

3. Process 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-to-buffer ratio should be approximately a 1:2 to 1:3 ratio (i.e., the volume of buffer should be about 2 to 3 times that of the stain).

EXAMPLE: 1.6 mL stain per 10 slides = 0.16 mL/slide  
4.1 mL buffer per 10 slides = 0.41 mL/slide

Therefore: 0.16 : 0.41 ratio = 1 : 2.56 ratio  
between stain and buffer.  
(0.41 ÷ 0.16 = 2.56)

b. The rinse solution volume should be approximately 1 mL/slide (i.e., 10.0 mL/10 slides = 1.0 mL/slide). Adjust the rinse volume dial to deliver approximately 1 mL/slide.

4. A properly stained slide is the result of an interactive process involving the pump volumes, the mixing process, and the stain-to-buffer ratio. A minimum ratio of 1:2 is recommended; however, if the slides are filling properly, good mixing is occurring, and the stained slides are acceptable under the microscope, the stain-to-buffer ratio should not be adjusted.

If adjustments need to be made, the volumes will change as follows:

*Stain and Buffer Knobs:* Each evenly-labeled increment will change the volume by approximately 0.1 mL per 10 slides (0.01 mL/slide).

*Rinse Knob:* Each evenly-labeled increment will change the volume by approximately 0.5 mL per 10 slides (0.05 mL/slide).

5. When the determinations are complete, reconnect the three tubes to their appropriate spouts and replace the waste tank.



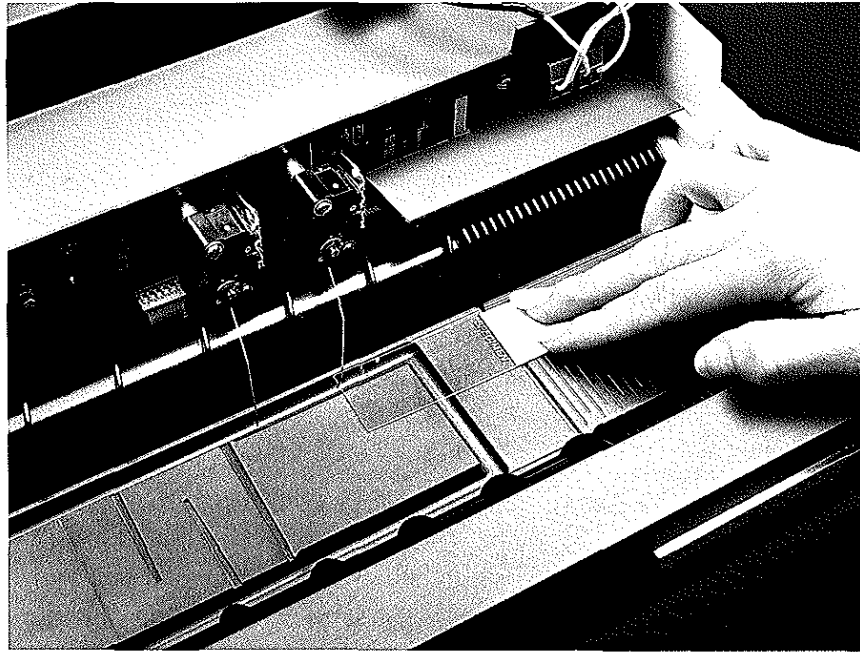


Figure 8-12  
**Checking for Adjustment of Sensing Switch Fingers**

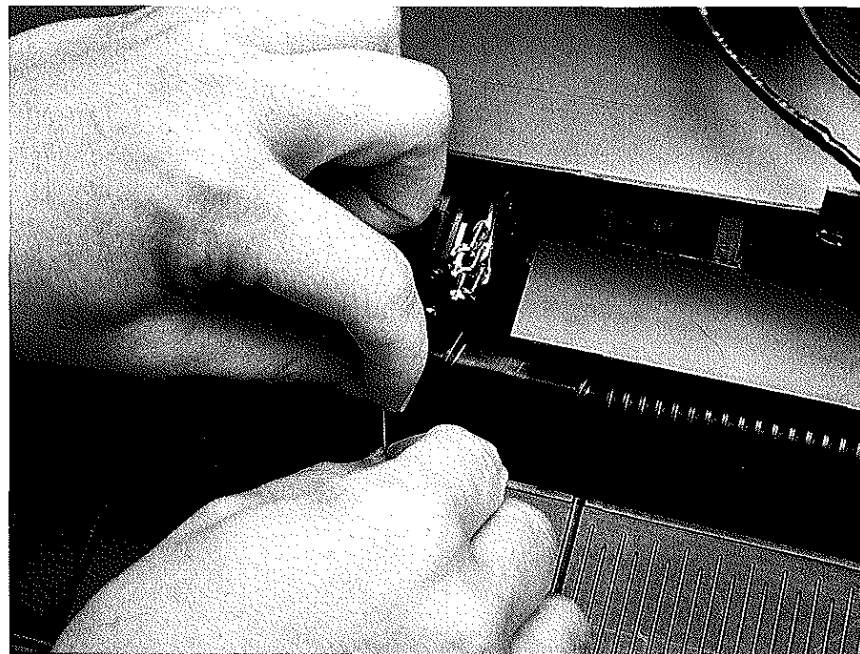


Figure 8-13  
**Adjusting the Sensing Switch Finger**

## G. Adjustment of Sensing Switch Fingers

The sensing switch fingers must be properly located in order to accurately activate the reagent pumps. If the reagents are not being dispensed at the proper time (as described in Part E, Step 6 above), the location of the fingers should be checked.

1. **TURN THE INSTRUMENT OFF AND REMOVE THE LINE CORD FROM THE AC ELECTRICAL OUTLET.**
2. Raise the clear plastic lid on the instrument, then loosen the two thumb screws on the back of the circuit board cover. Carefully rotate the panel up and back.  
**NOTE:** The circuit board cover is connected to the instrument by the two connectors of the "Low Stain" and "Power" lights. Rotate the panel carefully so the connectors are not pulled loose.
3. Check the location of each of the sensing switch fingers for the following two criteria:
  - a. Each finger should point straight down into the center of the back trough of the platen, without touching the bottom. If it is not, bend the finger *slightly* forward or backward as necessary, as directed in Step 4 below.
  - b. The sensing switch should be activated before the finger is lifted over the top surface of the slide. Check this as follows: Lay a slide lengthwise along the back edge of the platen. Slowly push the slide from right to left past the sensing switch finger, listening for a slight click as the sensing switch is activated (Figure 8-12). The click should be heard *before* the finger has been lifted onto the top of the slide. Test each finger in the same manner. If the click is not occurring at the proper time, bend the finger slightly to the right, as directed in Step 4 below.

- 
4. If adjustment to a sensing switch finger is necessary, support the wire near the center and carefully bend the lower part of the wire (Figure 8-13). If bending to the right, bend the wire *no more than 1/4 inch (7 mm) past perpendicular*. Check each adjustment for the two criteria given in Step 3 above, then verify the final adjustment by processing several slides across the platen, as described in Part E, Step 6 above. If these adjustments do not result in correct timing, contact the Customer Service Department by calling toll free 1-800-348-8100 (continental U.S. only). Outside of the United States, contact your nearest HEMA-TEK® instrument representative or distributor.

## **SERVICE AND REPLACEMENT PARTS**

### **Where to Call for Service**

When problems arise during operation of the HEMA-TEK® 2000 Slide Stainer, first refer to Section 7, TROUBLESHOOTING. Avoid problems by carefully following proper operating and cleaning procedures. If the problem cannot be solved and an instrument failure is apparent, contact your nearest authorized Customer Service or Instrument Service Representative. In the United States, contact the Customer Service Department of Miles Inc., Diagnostics Division by calling toll free 1-800-348-8100 (continental U.S. only) for complete information regarding service for your HEMA-TEK 2000 instrument. In countries other than the United States, contact the nearest HEMA-TEK® instrument distributor or representative for service information.

If the problem centers on the HEMA-TEK® Stain Pak, contact the Customer Service Department (U.S. customers only). If located outside the United States, contact the nearest HEMA-TEK instrument distributor or representative.

Before calling for instrument service, collect the information stated in the following "Preservice Checklist." This information will help the Customer Service Representative to identify the probable cause of your instrument malfunction.

---

## HEMA-TEK® 2000 Preservice Checklist

For reference, record the following information:

Instrument Serial Number \_\_\_\_\_

Installation Date \_\_\_\_\_

|  | YES                        | NO                       |
|--|----------------------------|--------------------------|
| 1. Has Section 7, TROUBLESHOOTING, been reviewed?                              | <input type="checkbox"/>   | <input type="checkbox"/> |
| 2. Is the unit plugged into a live AC electrical outlet?                       | <input type="checkbox"/>   | <input type="checkbox"/> |
| 3. Does the "Power" light illuminate when the instrument is turned <i>on</i> ? | <input type="checkbox"/>   | <input type="checkbox"/> |
| 4. Has the line fuse been checked and replaced if defective?                   | <input type="checkbox"/>   | <input type="checkbox"/> |
| 5. Is the slide drying system operating properly?                              | <input type="checkbox"/>   | <input type="checkbox"/> |
| 6. Are the conveyor spirals operating?   | <input type="checkbox"/>   | <input type="checkbox"/> |
| 7. Is the "Low Stain" light operating properly?                                | <input type="checkbox"/>   | <input type="checkbox"/> |
| 8. Do all three stations pump reagent properly?                                | <input type="checkbox"/>   | <input type="checkbox"/> |
| 9. Do all stations pump reagent at the proper time?                            | <input type="checkbox"/>   | <input type="checkbox"/> |
| 10. Is the instrument level?   | <input type="checkbox"/>   | <input type="checkbox"/> |
| 11. Has the platen been cleaned each day?                                      | <input type="checkbox"/>   | <input type="checkbox"/> |
| 12. Has the stain tubing been cleaned each day?                                | <input type="checkbox"/>   | <input type="checkbox"/> |
| 13. Are the sensing fingers properly adjusted?                                 | <input type="checkbox"/>   | <input type="checkbox"/> |
| 14. When was the pump tubing last changed? _____                               |                            |                          |
| 15. When was the underplaten tubing last changed? _____                        |                            |                          |
|  | Stain:                     | _____                    |
|  | Buffer/Rinse:              | _____                    |
| 16. Stain Pak information:   |                            |                          |
|  | (check one) Wright's _____ | Wright-Giemsa _____      |
|  | Lot # _____                | Exp. Date _____          |
| 17. Give a brief description of the problem: _____                             |                            |                          |
| _____  |                            |                          |
| _____  |                            |                          |
| _____  |                            |                          |

## Accessory Items

| <b>Product No.</b> | <b>Description</b>                        |
|--------------------|---|
| 4481               | HEMA-TEK® Stain Pak — Wright's Stain      |
| 4405               | HEMA-TEK® Stain Pak — Wright-Giemsa Stain |
| 4482               | HEMA-TEK® Pump Tube Set                   |
| 4484               | HEMA-TEK® Underplaten Tubing              |
| 4483               | HEMA-TEK® Cannula Set                     |

In the United States, the above Accessory Items are available from your authorized HEMA-TEK 2000 distributor. Outside of the United States, contact the nearest HEMA-TEK instrument distributor.

## Replacement Parts

| <b>Part No.</b> | <b>Description</b>                       |
|-----------------|--|
| 40151114        | Line Fuse — 0.4 amp, 5mm x 20mm, Slo-Blo |
| 94000787        | "Power" Light Assembly (Green)           |
| 94000788        | "Low Stain" Light Assembly (Red)         |
| 99944889        | Operating Manual                         |

In the United States, the above Replacement Parts may be ordered directly from Instrument Service, Miles Inc., Diagnostics Division, P.O. Box 2004, Mishawaka, IN 46544, or by calling toll free 1-800-348-8100. Outside of the United States, contact the nearest HEMA-TEK instrument distributor.

# HEMA-TEK® 2000

## Slide Stainer

Please record the following information. Keep this sheet  
in the operating manual for future reference.

---

Date of Installation

Serial No.

Model No.

### MANUFACTURER'S WARRANTY

Miles Inc., Diagnostics Division warrants to the original purchaser that this instrument will be free from defects in materials and workmanship for a period of one (1) year from the date of original purchase and/or installation (except as noted below). During the stated one-year period, Miles shall replace with a reconditioned unit or, at its option, repair at no charge a unit that is found to be defective.

This warranty is subject to the following exceptions and limitations:

1. A 90 day warranty only will be extended for consumable parts and/or accessories.
2. This warranty is limited to repair or replacement due to defects in parts or workmanship. Parts required which were not defective shall be replaced at additional cost, and Miles shall not be required to make any repairs or replace any parts which are necessitated by abuse, accidents, alteration, misuse, neglect, maintenance by other than Miles, or failure to operate the instrument in accordance with instructions. Further, Miles extends no warranty for malfunction or damage to instruments due to use of reagents other than reagents manufactured or recommended by Miles.
3. Miles reserves the right to make changes in design of this instrument without obligation to incorporate such changes into previously manufactured instruments.

#### Disclaimer of Warranties

THIS WARRANTY IS EXPRESSLY MADE IN LIEU OF ANY AND ALL OTHER WARRANTIES EXPRESS OR IMPLIED INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE.

#### Limitations of Liability

In no event shall Miles be liable for indirect, special or consequential damages, even if Miles has been advised of the possibility of such damages.

For warranty service, purchaser must contact the Customer Service Dept. of Miles Inc., Diagnostics Division, by calling toll free 1-800-348-8100, for assistance and/or instructions for obtaining repair of this instrument.

\_\_\_\_\_

100

100

100

100