



## Vacuum Infiltration Processor

### MODEL NUMBERS

5214 - Bench  
5215 - Floor (115 VAC, North America)

5216 - Bench  
5217 - Floor (230 VAC, Europe)

5218 - Bench  
5219 - Floor (220-240 VAC, Asia)

5220 - Bench  
5221 - Floor (115 VAC, Asia)

5222 - Floor (100 VAC, Asia)

**Operating  
Manual**

**IMPORTANT NOTICE**

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

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Manufactured for:

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Sakura Finetek Europe B.V., 2382 AT Zoeterwoude, NL

Made in Japan

# TABLE OF CONTENTS

<b>Section</b>	<b>Page</b>
<b>1 INTRODUCTION</b>	
General Description .....	1.1
Physical Characteristics .....	1.2
Principles of Operation .....	1.6
Safety Features .....	1.6
Specifications .....	1.7
<b>2 INSTALLATION</b>	
General Information .....	2.1
Environmental Factors .....	2.1
Unpacking .....	2.1
Instrument Setup .....	2.3
Precautions .....	2.5
<b>3 EXPLANATION OF SOFTWARE AND CUSTOMIZATION OF SETTINGS</b>	
General Information .....	3.1
1. System Setup .....	3.2
1.1 Date and Time .....	3.2
1.2 Passwords .....	3.3
1.3 Printer .....	3.3
1.4 Instrument Number .....	3.3
1.5 Valve Heating .....	3.3
1.6 Level Sensors .....	3.3
1.7 Alarm Tones .....	3.3
1.8 Alarm Volume .....	3.3
1.9 Keystroke sound .....	3.3
2. Utility Functions .....	3.4
2.1 Manual Operations .....	3.4
2.2 Error Information .....	3.4
2.3 Check Paraffin .....	3.6
3. Solution Control .....	3.6
4. Edit Programs .....	3.8
4.1 Program All Stations .....	3.10
4.2 Program Copy .....	3.11
4.3 Name Program .....	3.11
5. Start Process .....	3.12
6. Drain Retort .....	3.13
7. Clean Retort .....	3.14
8. Exchange Solutions .....	3.15

<b>Section</b>	<b>Page</b>
<b>4 OPERATING INSTRUCTIONS</b>	
Routine Operation .....	4.1
Interrupting the Run .....	4.3
Recommendations for Efficient Operation .....	4.5
<b>5 ACCESSORIES</b> .....	<b>5.1</b>
<b>6 CARE OF THE INSTRUMENT</b>	
General Maintenance .....	6.1
Daily Maintenance .....	6.1
Retort .....	6.1
Water Bottle .....	6.1
Exterior Surfaces .....	6.1
Weekly Maintenance .....	6.2
Reagent Exchange and Warm Water Flush .....	6.2
Clean Cycle Reagents .....	6.2
Periodic Maintenance .....	6.2
Activated Carbon Cartridge .....	6.2
Overflow Bottle .....	6.2
Bottle Connectors .....	6.3
Disinfection .....	6.3
<b>7 TROUBLESHOOTING</b>	
General Information .....	7.1
Troubleshooting Chart .....	7.2
<b>8 MINOR REPAIR</b>	
General Information .....	8.1
Replacement of Retort Gasket .....	8.1
<b>9 SERVICE AND REPLACEMENT PARTS</b>	
Service Information .....	9.1
When You Have a Problem .....	9.1
Where to Call for Service .....	9.1
Preservice Checklist .....	9.2
Replacement Accessory Items .....	9.3
Replacement Parts .....	9.3
<b>Appendix</b>	<b>Page</b>
<b>A EXAMPLE PROCESSING PROGRAMS</b>	
Sample Programs .....	A.1
Routine Overnight Run .....	A.2
Rush or Biopsy Run .....	A.2
Individual Programs .....	A.3
VIP 5 Menu Map A Operator Mode .....	A.4
VIP 5 Menu Map A Operator Mode .....	A.5

# INTRODUCTION

## General Description

The Tissue-Tek® VIP™ 5 Vacuum Infiltration Processor is an automatic, self-contained tissue processor, which holds up to 150 tissue cassettes or up to 300 cassettes, as selected by the user. The VIP™ 5 is available as a floor model (Figure 1-1) and bench top model (Figure 1-2).

The VIP software is programmable for up to twenty different programs for use in the fixation, dehydration, clearing, and paraffin infiltration of a variety of human, animal, or plant tissue specimens. The operator can program the instrument to begin processing either immediately or in a delay mode. In delay mode, the operator enters a desired end time and the instrument then automatically calculates the program start time.

The instrument consists of four major components:

- **the control panel**, through which all operations are controlled
- **the retort**, an enclosed chamber that holds the tissue specimens and in which all processing occurs
- **the paraffin oven**, which maintains molten paraffin at the appropriate temperature for use in the paraffin infiltration steps
- **the reagent cabinet**, which holds the bottles of reagents.

The operator places baskets containing tissue cassettes into the retort. The instrument then sequentially moves processing reagents and molten paraffin into and out of the retort through the use of vacuum and pressure. The heat of the paraffin oven causes the evaporation of clearing reagent from the paraffin. A degassing feature aspirates the air from the oven after every automatic pump-in cycle. This action sends the vapor-laden air through the VIP's air filtration system. The closed-system design along with the air filtration system, ensure a sealed, moist environment for the tissues and an essentially fume-free environment outside the VIP. Reagent bottles can be filled either manually or through the external drain and fill port.

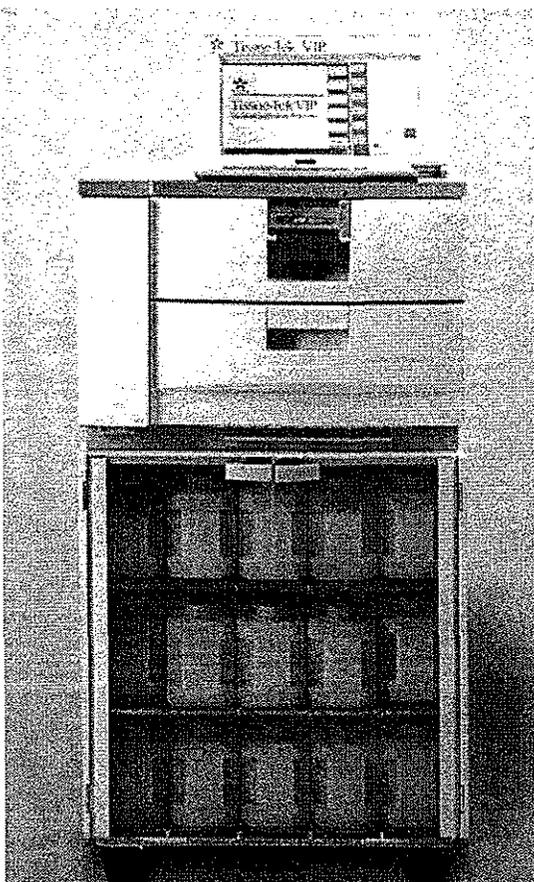


Figure 1-1

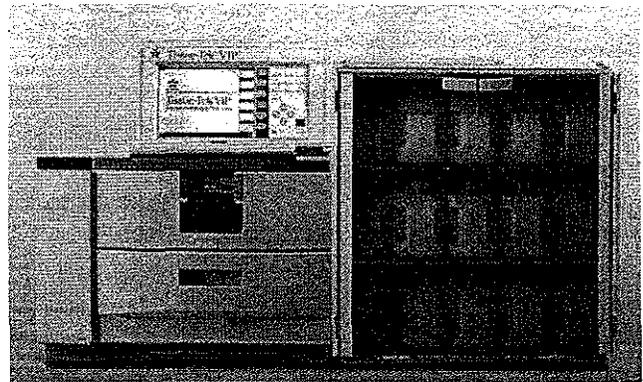


Figure 1-2

# INTRODUCTION

## Physical Characteristics

**NOTE:** All figures in this manual use the floor model. Its components are identical to those of the bench model. In the bench model, however, the module that holds the reagent cabinet is located to the right side of the retort and control panel, rather than beneath.

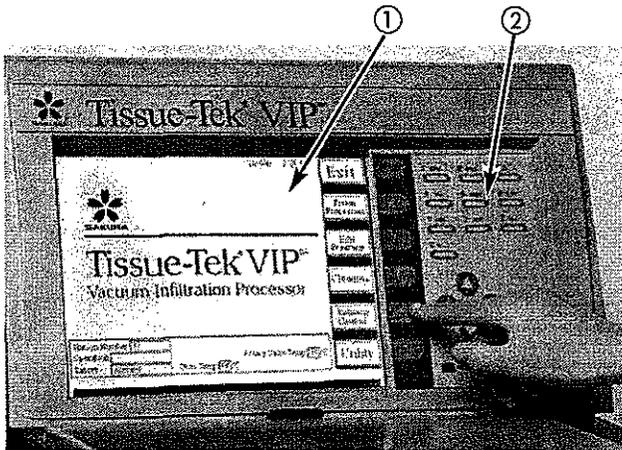


Figure 1-3

### Control Panel (Figure 1-3)

The control panel contains the screen display ① and the keypad ②, which the operator uses to communicate with the instrument software. A contrast adjustment knob is located behind the left hand side of the display. If no keys are pressed for 10 minutes, the display will revert to a screen saver mode where the display is dimmed. Pressing any key will reinstate full brightness, but the action of that key will be ignored otherwise by the software.

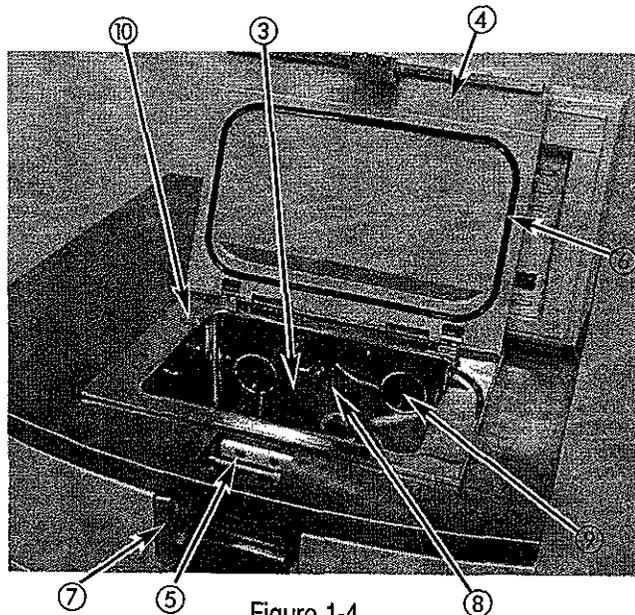


Figure 1-4

### Retort (Figure 1-4)

The retort ③ is the chamber in which processing actually occurs. One or more baskets, which hold the specimens, are placed into the retort. If the instrument is used as a 150 samples instrument using a lower reagent volume, displacement blocks provided in the accessory kit must be placed in the bottom basket. During processing the retort lid ④ is held securely closed by a latch system ⑤. The retort gasket ⑥ provides sealing of the retort. The retort interlock slide bar ⑦, when in place over the latch system, prevents access to the retort. During processing, when the retort bar is moved to the open position, processing stops immediately, and an alarm sounds until the retort bar is moved to the closed position. Solutions are introduced from the top of the retort ⑧ and drained from the bottom. Level sensors ⑨ detect proper solution levels during pump-in. If desired, level sensing can be disabled. Fluid level control would then be accomplished through the detection of a pressure drop or a vacuum change condition in the retort. The air port ⑩ is connected to an overflow sensor and bottle.

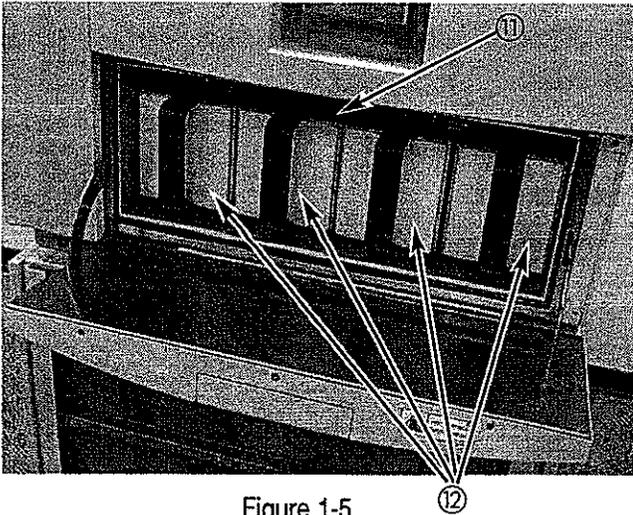


Figure 1-5

**Paraffin Oven** (Figure 1-5)

The paraffin oven ⑪ maintains a set temperature to hold molten paraffin at the proper temperature for use in the infiltration step. The oven holds four paraffin containers ⑫ that are easily removed by the operator for refilling. These containers are designated as stations 11 through 14. Each container accepts one front and one back anti-splash insert to reduce splashing when containers are removed or inserted.

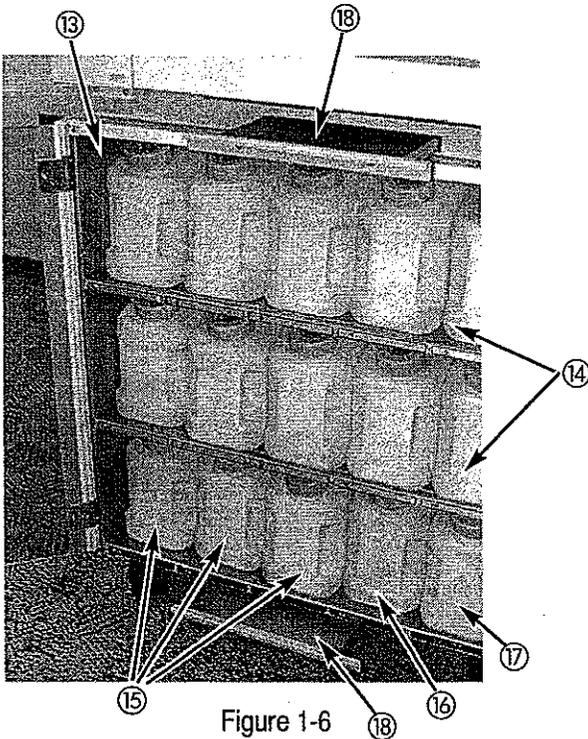


Figure 1-6

**Reagent Cabinet** (Figure 1-6)

The reagent cabinet ⑬ holds ten bottles of processing reagents, designated as stations 1 through 10 ⑭ located in the first two top rows. In the third row, three additional stations (15 through 17) hold bottles for xylene, alcohol and water ⑮, used during the cleaning cycle. The final two spaces hold a waste bottle ⑯ used when an automated reagent transfer procedure is performed, and a bottle for water ⑰, which is an essential component of the fume control system of the instrument. The first two top rows have cutouts for the placement of one drain shelf each. Waste trays ⑱ are located below the paraffin oven and below the reagent cabinet.

# INTRODUCTION

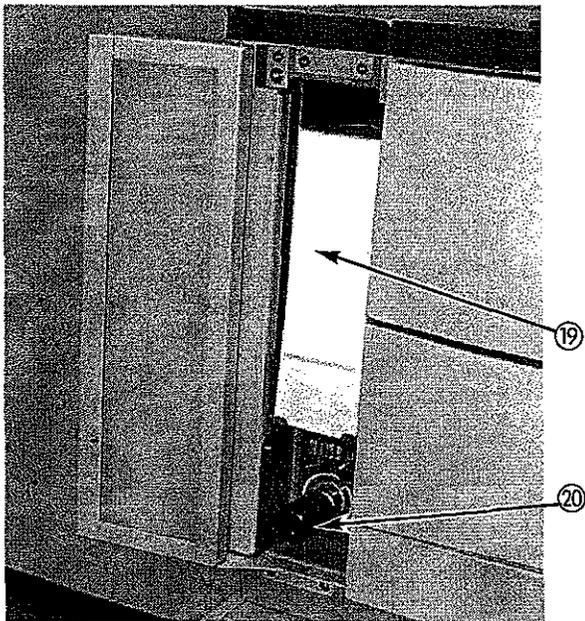


Figure 1-7

## Activated Carbon Cartridge and External Drain and Fill (Figure 1-7)

The activated carbon filter (19) is part of the fume control system. The external drain and fill port (20) allow for the replacement of reagents 1 through 10 and 15 through 18 directly from external containers.

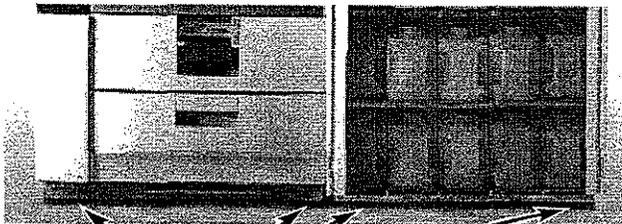


Figure 1-8

## Leveling Feet/Casters (Figures 1-8 and 1-9)

The bench model has eight adjustable feet (21) to ensure proper leveling of the instrument.

The floor model has four casters (22) for instrument mobility; positive locks on the front casters hold the instrument securely in place for stationary use.

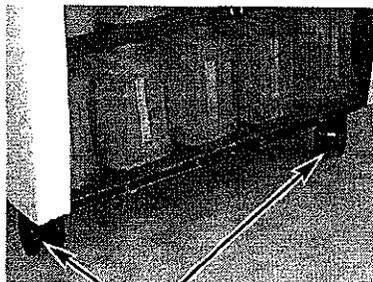


Figure 1-9

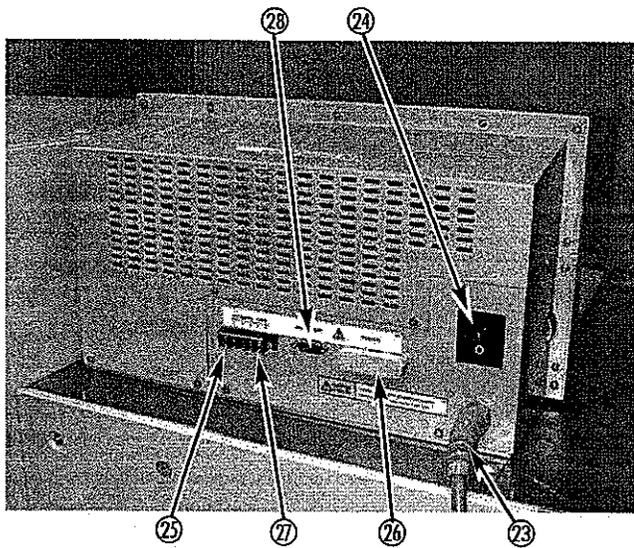


Figure 1-10

### Rear of the Instrument (Figure 1-10)

The line cord ②③ is permanently attached to the instrument. The other end of the cord attaches to an appropriate AC electrical outlet or to an Uninterruptible Power Supply (UPS) unit. The instrument is turned **on** and **off** with the circuit interrupter ②④. The panel also contains a connector for an external alarm ②⑤. A power outage will activate the external alarm immediately. The following conditions will activate the external alarm five minutes after they occur: the retort bar remains in the open position during any automatic operation (including a DELAY cycle); a condition leading to an error or warning display is left unattended; or power has been restored following an outage.

The rear panel can accommodate optional interfaces for an optional printer and uninterruptible power supply (UPS). The printer connection ②⑥ allows the printing of reports automatically and on demand. The UPS option ②⑦ allows the instrument to be connected to a backup generator. A serial port ②⑧ is also supplied to transmit data to an external device.

# INTRODUCTION

## Principles of Operation

As soon as a start command is issued by the operator, the rotary and gate valves in the instrument open the passage to the retort from the first reagent station for which a processing time is programmed. The rotary valve will then cycle through all bottle positions to verify proper connection. The operator will be alerted of any faulty condition. If desired, the bottle connection check feature can be bypassed.

Reagent movement is effected as follows: the rotary and gate valves move to open the passage to the retort. A vacuum is created in the retort, and it draws the reagent from the bottle into the retort. All reagents are introduced from the top of the retort. This action is called a "pump-in." The gate valve then closes, and the specimens are immersed in the reagent for the selected length of time. After this time, pressure is created in the retort and the gate valve opens again, forcing the reagent from the retort back into the reagent bottle. All reagents are drained from the bottom of the retort. A mesh prevents debris from being transferred to the bottle. This action is called a "pump-out." The rotary valve then rotates to the next station for which a processing time is programmed and the procedure is repeated.

During the immersion time, three additional options are available as histologic choices for the treatment of the specimens. Application of any of these three physical conditions can increase the reagent infiltration of the specimens. These three options may be programmed into individual and/or all stations.

**P/V Cycle:** The instrument alternates applying pressure and vacuum to the retort. During the Pressure portion of the P/V cycle, paraffin is automatically cleansed.

**Mixing:** Depending on which option (slow or fast) has been selected, pump-out and pump-in of the same reagent is repeated every 12 or 20 minutes, or continuous (cont) mixing can be selected. In that mode, partial pump-in and pump-out cycles are effected to promote optimum infiltration during short immersion steps. If desired, mixing can be turned OFF.

**Heat:** The surfaces of the retort are heated to the programmed temperature for the duration of the immersion time for that station.

After completion of a processing run, the instrument

automatically prompts for a cleaning cycle. This can be overridden ONLY if no reagents from Stations 11-14 (paraffin) were pumped into the retort. In the Clean Cycle, the retort heats and the remaining melted paraffin is pumped into the last paraffin station for which a processing time was programmed. Xylene is then repeatedly pumped into and out of the retort. This is followed by multiple rinses with alcohol and/or water. Up to two different cleaning cycles can be programmed by the user.

## Safety Features

- The VIP instrument is designed as a closed-system tissue processor to minimize the release of reagent fumes into the environment. It also contains a fume control system, consisting of water and an activated carbon filter, to purify the air that it releases.
- The retort slide bar prevents access to the retort during processing. If the bar is slid to the left (open), processing stops immediately, any vacuum/pressure in the retort is released, and the audible alarm sounds.
- A reagent bottle connection check is automatically performed by the instrument when a start process is initiated, unless disabled by the user.
- If the instrument is unable to pump a reagent into the retort (e.g., the bottle is empty or not properly connected), the reagent from the previous station will be pumped back into the retort and the audible alarm sounds.
- When selected, the solution manager function will allow the instrument to complete a processing run even if a faulty pump-in or pump-out condition occurs if certain safeguard conditions are met.
- Level sensors are provided to ensure positive fluid level sensing during special procedures such as continuous mixing.
- The instrument contains an alarm that sounds whenever there is an error condition that stops processing. The instrument can also be connected to an external alarm that will alert personnel in case of an error during the night or weekend when the laboratory is not occupied.
- Two levels of password, manager and user, can be entered into the software to prevent access to the program settings and processing function by unauthorized personnel.

## Specifications

### Power Required:

Model Numbers: 5214 — Bench 5215 — Floor	115 VAC, ± 10%, 60 Hz, 11.0 A (North America)
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Model Numbers: 5216 — Bench 5217 — Floor	230 VAC, 50 Hz, 6.0 A (Europe)
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Model Numbers: 5218 — Bench 5219 — Floor	220/240 VAC, ± 10%, 50 Hz, 6.0 A (Asia)
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Model Numbers: 5220 — Bench 5221 — Floor	115 VAC, ± 10%, 50 Hz, 11.0 A (Asia)
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Model Numbers: 5222 — Floor	100 VAC, ± 10%, 50/60 Hz, 10.0 A (Asia)
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### Dimensions:

Floor Model:

- Depth — 60.0 cm (23.6 in.)
- Width — 60.0 cm (23.6 in.)
- Height — 136.0 cm (53.5 in.)

Bench Model:

- Depth — 60.0 cm (23.6 in.)
- Width — 120.0 cm (47.2 in.)
- Height — 70.0 cm (27.5 in.)

### Weight:

Approximately 160 kg (252 lb.) — without accessories and reagents

# INTRODUCTION

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## Capacity/Fill Volumes:

Cassettes — 150 or 300  
Cassette Baskets —  
    1, 2 or up to 4 optional 65-cassette baskets  
Processing Reagent Stations — 10  
Paraffin Stations — 4  
Cleaning Reagent Stations — 3  
Fume Control Stations — 2  
Waste Station — 1  
Reagent Bottles — 2.7 L (for 150 cassettes) or  
    3.7 L (for 300 cassettes) each  
Cleaning Bottles — 3.5 L each (for 150 cassettes) or  
    4.5 L (for 300 cassettes)  
Paraffin Containers — 2.7 L (for 150 cassettes) or  
    3.7 L (for 300 cassettes) each

## Operating Conditions:

Temperature — 10° C to 40° C (50° F to 104° F)  
Relative Humidity — 30% to 85% RH

## Fluid Transfer Pressures:

Pump In — (0.35 kg/cm<sup>2</sup>) nominal  
Pump Out — (-0.24 kg/cm<sup>2</sup>) nominal

## P/V Cycle:

Pressure — 0.35 kg/cm<sup>2</sup>  
Vacuum — -0.71 kg/cm<sup>2</sup>  
    90 Seconds Pressure; 30 Seconds Ambient;  
    90 Seconds Vacuum; 30 Seconds Ambient

## Mixing:

Pump Out and Pump In every 12 or 20 minutes,  
continuous, or OFF. User-selectable for each  
processing station.

## Temperature Capabilities:

Retort Solutions — 35° C to 50° C (95° F to 122° F)  
Paraffin — 45° C to 70° C (113° F to 158° F)  
Paraffin Oven — 47° C to 72° C (116.6° F to 161.6° F)

## Safety Standards

Tested and listed by Inchcape Testing Services (ITS).  
Complies with: UL3101-1, 1st ed.  
    CAN/CSA-C22.2 No. 1010.1-92

# INSTALLATION

## Section 2

### General Information

This section provides information on selecting a proper location, unpacking, and installing the Tissue-Tek® VIP™ 5 instrument. A Tissue-Tek instrument representative or a certified Biomedical Equipment Technician should perform the installation. The instrument must be installed correctly to ensure proper operation and service. **Read this Operating Manual carefully before attempting to operate the instrument. Follow all instructions carefully.**

The VIP processor 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

Environmental factors influence the selection of a proper location for the VIP instrument. As with all sensitive electronic instruments, prolonged exposure to excessive humidity and temperature should be avoided. Temperature and humidity should be held relatively constant to obtain the highest degree of operating stability. The ambient temperature range for operating the instrument is 10° C to 40° C (50° F to 104° F). The ambient operating humidity range is 30% to 85% relative humidity.

Locate the instrument in a **well-ventilated** area, avoiding exposure to corrosive vapors or temperature extremes. Avoid proximity to direct sunlight, open windows, sinks, ovens, open flames, hot plates, radiators, and dry ice baths. It should also be located away from any instrument that consumes a high voltage or large current, including large refrigerators and ovens. If installing a floor model, the floor must be solid and level; for bench models, the bench must have a firm level surface capable of supporting at least 181 kg (400 lbs.) of weight.

Be sure the instrument will be located near a power source that meets the electrical requirements (voltage and amperage) specified on the rating label located on the rear of the instrument. The power receptacle must be grounded and should be a clean, noise-free, dedicated line.

### Unpacking

1. Unpack the instrument by lifting the shipper off. **Carefully** lift the instrument off the wooden base.

**CAUTION: The instrument is very heavy and large; therefore, it is strongly recommended that it be lifted and transported by at least two people.**

2. **Floor Model:**

After the instrument is unpacked, roll it to a firm, level surface in the designated work area. Once in its final position and all installation steps are complete, lock the front casters to prevent instrument movement.

**Bench Model:**

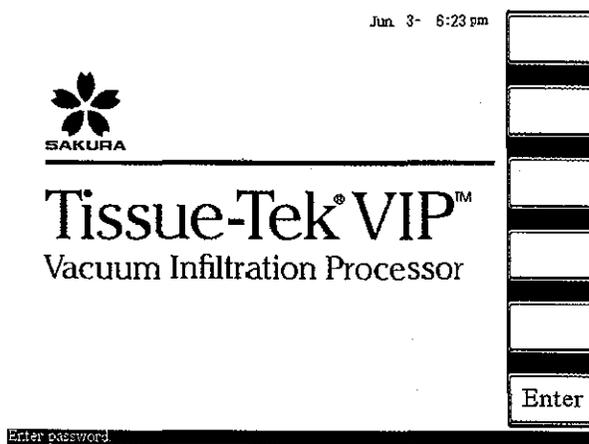
After the instrument is unpacked, **carefully** lift it into place on a firm, level surface in the designated work area. Be sure that each leveling foot fully contacts the bench top and that each foot has been properly adjusted so the instrument is level.

# INSTALLATION

3. Confirm that all of the following accessories have been included with the instrument:
  - Operating Manual — 1  
(including Warranty Registration—U.S. customers only)
  - Reagent Bottles — 15
  - Paraffin Containers — 4
  - Front Anti-Splash Inserts — 4  
(already inserted in the paraffin containers)
  - Back Anti-Splash Inserts — 4  
(already inserted in the paraffin containers)
  - Activated Carbon Cartridges — 2
  - Cassette Baskets — 2
  - Blank Bottle Labels (150 samples) — 1 set
  - Blank Bottle Labels (300 samples) — 1 set
  - Drain & Fill Hose — 1
  - Displacement Blocks — 3
  - Basket Transport Tray — 1

If any of these items are missing, contact your Customer Support Representative (refer to Section 9). If there is visible shipping damage to any item, immediately file a complaint with the carrier. Then, notify your nearest Tissue-Tek instrument distributor, or call Sakura directly.
4. Plug the instrument power cord into a dedicated, grounded electrical power source of the proper voltage and amperage.
5. Move the main power switch, located on the rear of the instrument behind the control panel, to the ON position. A small green light on the control panel will illuminate.
 

**NOTE:** The instrument will not begin automatic operation until approximately 24 hours after the power is turned on. This ensures that the oven temperature has reached and stabilized at its set temperature. (Refer to Section 3, "Check Paraffin" to override this delay.)
6. The screen on the control panel should be displaying the Startup Screen (shown below), requesting entry of the Password. Press "0" "0" "0" "0" on the keypad; and the "Enter" function key; the display will change to the Main Menu, which includes an instrument status area located at the bottom of the display. Up to two different passwords can be programmed. (Refer to Section 2, "Passwords" to change the default password).
7. Connect the external alarm and optional printer, if desired.
8. Locate the serial number label found on the left side of the instrument control panel. Write the installation date and instrument serial number on the Warranty Registration Card found in the front of this manual. Also write the installation date and serial number in the "Preservice Checklist" in Section 9. Completely fill out the Warranty Registration Card and mail it.



Startup Screen

## Instrument Setup

1. Open the doors on the front of the reagent cabinet by pulling the handle on the upper inside corner of each door.
2. The reagent bottles are connected to the instrument by "quick-release" connectors that enable the bottles to be securely connected or removed with one hand.

Remove each bottle from the reagent cabinet by pulling the bottle toward you (Figure 2-1).

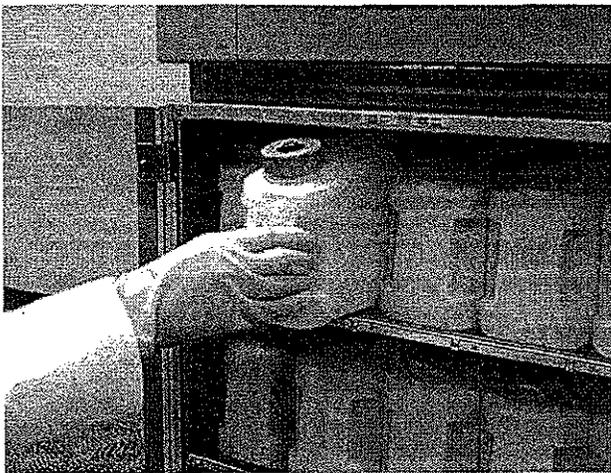


Figure 2-1

3. Color-coded labels are provided for both 150 or 300 cassette operation. Affix a label and mark each one according to the desired solution type.

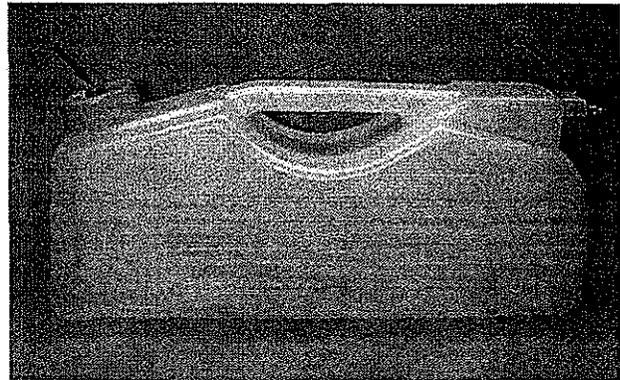


Figure 2-2

4. Bottles can be filled manually or through the external drain and fill port. If filled bottles need to be moved to another location, flip loose the small dark colored cap ① located on top of the bottle screw cap. Affix the small cap to the connector end of the bottle ②. To fill the bottles manually, be sure the bottles are placed on a level surface (Figure 2-2). Remove the bottle cap by turning it counterclockwise. Replace the cap when finished. Ensure that the bottle is securely connected by gently pulling it out. It should not budge. If there is any movement, try connecting the bottle again.

To fill or top off the bottle using the external drain and fill port, use the procedure that follows: (A more complete description of the solution exchange function is given in Section 3 "Exchange Solutions.")

# INSTALLATION

- a. Connect the drain/fill hose to the external drain port ③ (figure 2-3) located behind the door on the left side of the instrument next to the paraffin oven. Push gently on the lower right of the door where indicated to get access to the port.
- b. Insert the other end of the drain/fill hose into a reagent container with at least 5 liters of reagent left. Make sure the reagent in the container is the same as the one programmed for that station.
- c. From the Main Menu, press the "Solution Control" function key, then press the "Exchange" function key.
- d. Press the "Fill" function key.
- e. As instructed, on the screen input the station number to be filled and press "Enter."
- f. Press the function key "Select Vol. Normal/Full" to select the appropriate fill volume. When the instrument is used for 300-cassette processing, the "Normal" fill volume will pump in 3.7L of reagent and the "Full" fill volume will pump in 4.5L of reagent. When used for 150-cassette processing, the "Normal" fill volume will pump in 2.7 L and the "Full" fill volume will pump in 3.5 L of reagent.

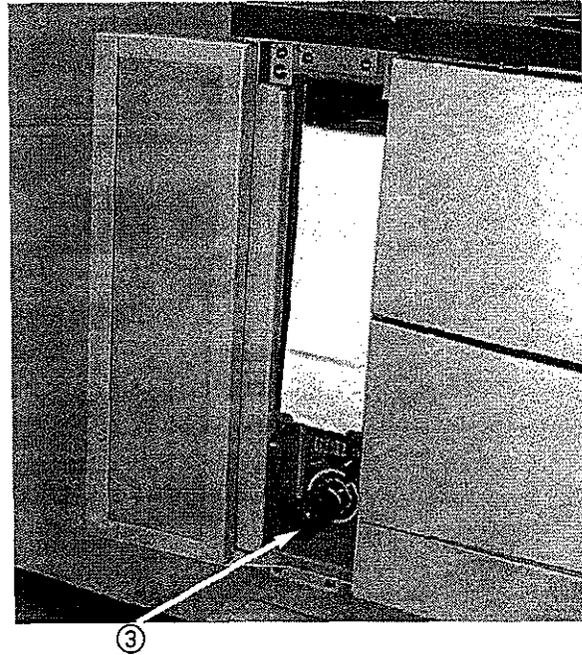


Figure 2-3

**NOTE:** The "Full" fill volume is selected when a higher ratio of reagent to tissue specimens is desired.

- g. Verify once again the connection, the reagent, and the station number. Press the "Start" function key when ready. The pump-in action will be automatically stopped when the fill level is reached.
- h. If desired, the drain/fill port can be rinsed using the "Rinse" function.

5. Remove the cartridge of activated carbon from its plastic bag. Open the door located on the left side of the paraffin oven by gently pushing where indicated. With the vent holes to the top and the connecting hole towards the instrument, slide the cartridge into the receptacle (Figure 2-4). When a slight resistance is felt, push firmly on the cartridge to ensure a proper connection.

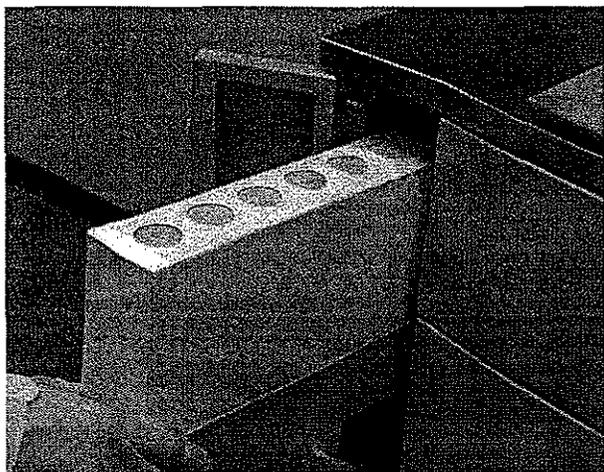


Figure 2-4

6. Monitor the temperature of the oven; the default temperature is 62° C (143.6° F). If this temperature is not suitable for the paraffin being used, set the appropriate temperature, as described in Section 3, "Edit Programs." If it is suitable, the paraffin containers can be filled with melted or unmelted paraffin.

Remove each paraffin container from the oven and install the front and back anti-splash inserts in each one of them, if not already done. Then fill to the embossed line with molten or unmelted paraffin. Make sure the anti-splash inserts are in place; these will prevent excessive splashing when the paraffin containers are inserted or removed. When filling with unmelted paraffin, it may be necessary to add more paraffin later to reach the fill level. DO NOT overfill the tanks; doing so may cause an overflow in the retort.

**WARNING: USE EXTREME CARE WHEN FILLING THE PARAFFIN CONTAINERS. MOLTEN PARAFFIN IS VERY HOT AND CAN CAUSE BURNS.**

7. **CAREFULLY** replace each paraffin container into the oven. When the door is closed, it will push against the containers making sure they are properly connected. Close the oven door.

## Precautions

There are several precautions that must be observed before operating the instrument:

1. Check the fill level of each reagent bottle to ensure the specified volumes. (Bottle levels will be specified by labels.) Over filling the bottles may cause an overflow in the retort, resulting in an error condition and halted processing.
2. Check the screw caps of each bottle to ensure tightness. Check each connection to ensure that it is properly seated.
3. Check the paraffin containers for proper fill level. Use only paraffin with the same melting point, not to exceed 70° C (158° F). DO NOT overfill the paraffin containers. Ensure that all tanks are properly seated in their connections.
4. NEVER open the retort lid if "VACUUM" or "PRESSURE" is being displayed for the retort atmosphere. Open the lid only when "AMBIENT" is being displayed.  
**NOTE:** The pressure and vacuum are released automatically through a safety relief valve when the retort bar is moved to the left. Wait for "AMBIENT" to be displayed before opening the lid.
5. Do not obstruct the ventilation louvers in the top of the control panel. This area must be kept clear to ensure proper ventilation. Also, do not place any containers of liquid on the top of the control panel; spillage could cause extensive damage to the instrument.



# EXPLANATION OF SOFTWARE/CUSTOMIZATION

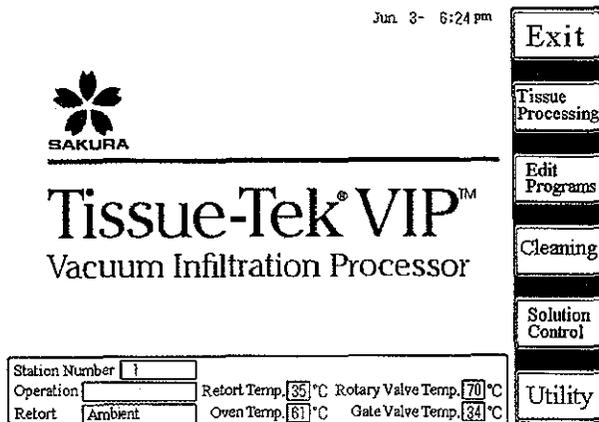
## General Information

The Tissue-Tek® VIP™ 5 Vacuum Infiltration Processor contains software that can be customized for the work routine and procedures used in the individual laboratory. This section explains the various operating modes and provides information on customizing the software. Many of the procedures in this section will be used upon initial installation and only rarely thereafter. However, detailed information on the progression of screen displays and prompts is given here; therefore, this section should be read thoroughly before beginning routine operation. Once you are familiar with this information, Section 4, "Operating Instructions," can be used as a quick reference for routine operation.

When the VIP instrument is first turned on, the startup screen (shown on page 2.2) is displayed, which requires entry of a "password" (entry code) to progress further in the displays. (This screen will also be displayed if the software exits from a processing program, such as after the Clean Cycle.) A default manager password code of "0000" is programmed into the instrument; enter this code, then press "Enter." The screen will then display the Main Menu, shown below.

On most screen displays, the date and time are displayed in the upper right corner and the software routine or operating mode in the upper left corner. The retort, oven, rotary valve and gate valve temperatures, the station number selected, the instrument operation and the retort condition are displayed in the bottom section of the display in the Main Menu and in some other screen displays. When applicable, the bottom two lines of the screen are reserved for the display of messages and warnings. The right hand side of the display has room for up to six function keys. A software label describes the function of the key and the function can be enabled by pressing the button adjacent to it. A blank key signifies that there is no associated function.

The Main Menu is the starting point for the routine operation of the instrument. Each menu item is explained below in a logical order of usage during the initial setup. Pressing the "Exit" function key will display the previous screen. Any information not saved before pressing this "Exit" function key would be lost.



Main Menu

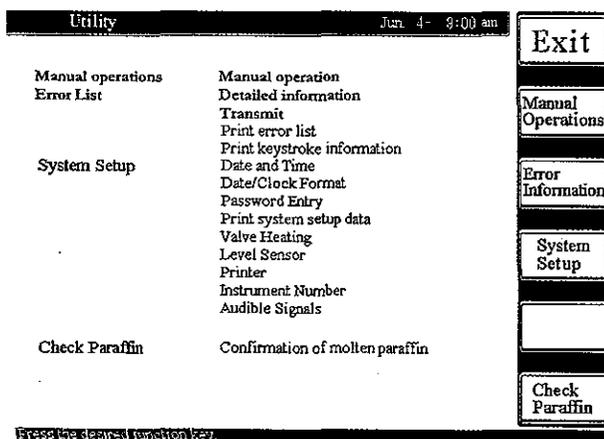
# EXPLANATION OF SOFTWARE

## 1. System Setup

To perform the initial setup, press the "Utility" function key in the Main Menu. If a user password was entered in the Startup Screen, the System Setup menu will not be available. To access all the functions of the Utility Menu, a manager password has to be entered. The User Utility Menu allows the operator to perform manual operations, to view or print the error information and to check paraffin status. The Manager Utility Menu allows the operator to perform the initial setup.

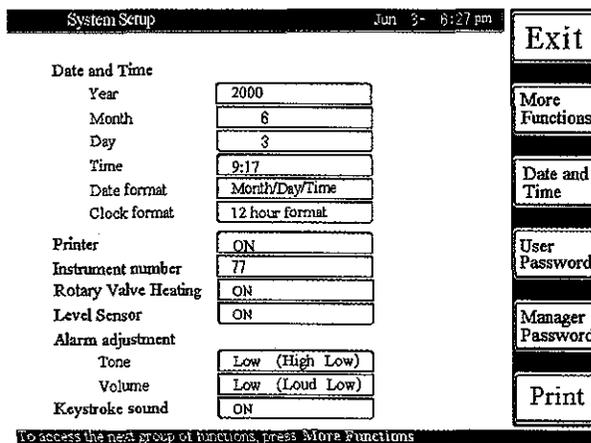
**NOTE:** The Print functions will not be shown unless the Printer option is selected as ON in the "System Setup" menu.

**NOTE:** The Check Paraffin function will not be shown until the oven has reached a temperature of 57° C.



Manager Utility Menu

The system setup screen is accessed by pressing on the "System Setup" function key.



System Setup

### 1.1 Date and Time

The date and time can be programmed by pressing the "Date and Time" function key from the System Setup screen. The display will show the year, month, day and time that are currently programmed and the related formats. Each can be changed as described below; if an entry is correct as displayed, simply press one of the arrow keys to continue to the next entry.

1. The blinking cursor will initially be on the last digit of "Year," with the prompt of "ENTER YEAR, DATE AND TIME AND SELECT DATE AND CLOCK FORMATS. PRESS SAVE." on the message line. If the year being displayed is incorrect, enter the correct four numerical digits, then use the arrow keys to move the cursor to the "Month, Day and Time" fields.
2. Enter the correct month, day and time, if necessary.
3. Using the "Date Format" and "Clock Format" function keys, configure the date and clock formats as needed. Press the "Save" function key when finished, or the "Exit" function key if you do not want to save the changes.

## 1.2 Passwords

The default manager password entered into the instrument is "0000". This entry code can be changed using up to two codes of four digits or more. The password can be added by pressing the "User Password" or the "Manager Password" function keys. The User password limits access to routine operations of the instrument only, including tissue processing, cleaning, warm water flush, solution exchange, manual drain of the retort and access to the error log. The Manager Password allows access to all instrument functions and setup. Both passwords are set up in the same manner as follows. First, press the desired function key.

1. The message line will prompt you to "ENTER NEW USER PASSWORD." or "ENTER NEW MANAGER PASSWORD". Enter the new password, pressing "Enter" when complete. Passwords must be 4-digit or more.
2. The prompt will change to "REENTER NEW PASSWORD FOR VERIFICATION."
3. Enter the new password a second time and press "Enter". If the second entry matches the first entry, the display will return to the System Setup Menu and the new password will be stored in memory for future use. If it does not agree, the message line will prompt "THE PASSWORD ENTERED DOES NOT MATCH. TRY AGAIN." Enter the new entry code again, taking care to enter the same code both times. Pressing "Exit" at any time before a successful reentry of the new code will reinstate the former password.

Pressing the "More Functions" function key allows user to access the following setup options.

## 1.3 Printer

From the System Setup Screen select the "More Functions" function key, and then the "Printer" function key.

By default, the printer selection is OFF. Press the "Printer" function key to turn the printer interface to ON. If the printer selection is ON, a "Print" function key will appear on page one of the Setup screen and in other screens.

**NOTE:** The printer is an optional item.

## 1.4 Instrument Number

An instrument number from 0 (default value) through 99 can be programmed by pressing the "Instrument Number" function key.

## 1.5 Valve Heating

The rotary and gate valves can be constantly heated at a temperature of 70° C. Even if the setting is OFF, (no heating), heat will be applied to the valves before station 11 to 14 are used (paraffin) and during the heating portion of the cleaning cycle. To heat the valves continuously press the "Valve Heating" function key once, if the current setting is OFF.

## 1.6 Level Sensors

By default, the level sensors are OFF. To enable the level sensors, press the "Level Sensor" function key once.

## 1.7 Alarm Tone

The alarm tone can be changed between two levels: "High" and "Low". Each time the "Alarm Tone" function key is pressed, the tone will be changed, the initial default setting being "High".

## 1.8 Alarm Volume

The alarm volume can be changed between two levels: "Loud" and "Low". Each time the "Alarm Volume" function key is pressed, the volume will be changed, the initial default setting being "Loud".

## 1.9 Keystroke Sound

By default, every time a key is pressed, a sound will be heard. By pressing the "keystroke sound" function key, the keystroke sound can be turned OFF. The initial default setting is ON.

# EXPLANATION OF SOFTWARE

## 2. Utility Functions

### 2.1 Manual Operations

The Manual Operations Mode is not used during normal operation of the instrument; however, manual operation may sometimes be necessary. Three functions can be achieved through the Manual Operations Mode:

- Drain Retort                 Pumps-out a reagent from the retort;
- Fill Retort                   Pumps-in a reagent into the retort;
- Change Station             Moves the rotary valve to the next station.

1. To enter the Manual Operations Mode, press "Utility" and then "Manual Operations" in the Utility Menu.
2. Select the desired function by pressing the appropriate function key. The function begins immediately, either pumping the reagent into the retort from the station number displayed, pumping the reagent out of the retort into the station displayed, or moving the rotary valve to the next station.
3. When the operation is complete, you can select another operation by pressing the appropriate key or repeat the "Change Station" operation. To abort the operation, press the "STOP" key.

**NOTE:** If a "Fill Retort" function was performed (that is, fluid was pumped into the retort), you must perform a Drain Retort before you will be allowed to change stations or to exit the Manual Operations Mode.

4. Press "Exit" twice to return to the Main Menu when you no longer require manual operation of the instrument.

### 2.2 Error Information

If an error occurs during a processing run, information about each error is displayed through the "Error Information" function. Each occurrence of an error is stored in sequential order for later display; the Warning line on the display will flash the message "ERRORS.XX,XX," with each error number listed.

When errors occur during a processing run, the run will be affected in one of three ways, depending upon the type of error:

- The instrument corrects the error and the processing run continues; however, the occurrence may have delayed the scheduled end time.
- The processing run is stopped; the error can be corrected by the operator and the run continued by following the prompts given on the message line of the display.
- The processing run is stopped and the error cannot be corrected without ending the run.

Errors that stop the run will cause an alarm to sound for 10 seconds every minute until the instrument is attended (and will set off the external alarm in five minutes if one is connected). Pressing the "ALARM OFF" key will silence the internal alarm; moving the retort bar to the left, then to the right, will silence the external alarm.

If a critical error has occurred that causes the run to be aborted, the display will flash the message "OPERATION INTERRUPTED. PRESS ANY KEY.;" the station line at which processing stopped will be highlighted, and the error numbers will be displayed on the warning line. The "Error Information" function can be utilized to help determine the cause of the error. Press any key; the processing run will end and the display will return to the Main Menu.

1. From the Main Menu, press "Utility" and then "Error Information". (It can also be entered during a processing run through the Stop Menu. See "Interrupting the Run" in Section 4). To view the current error, or to review up to 100 errors that previously occurred, press "Error List". In each case, the following information is displayed:

<b>Display</b>	<b>Explanation</b>
Error	Error number
Sta.	Station number at which error occurred
Time	Time at which the error occurred
Retort (°C).	Temperature of the retort
Oven (°C).	Temperature of the paraffin oven
Rotary Valve (°C).	Temperature of the rotary valve
Gate Valve (°C)	Temperature of the gate valve

2. Refer to Section 7, TROUBLESHOOTING, for a complete explanation of each error code that is displayed.
3. Record or print the screen information. Press "Error Description" to obtain an explanation for each error code. Press "Exit" to return to the Error List screen. The error list can be cleared using the "Clear" function key only if a Manager Password has been entered in the Startup Screen. The error codes will also clear automatically on a first in, first out basis after 100 errors have occurred.
4. To print the screen information, press the "Exit" function key to return to the Error Information screen, then press the "Print Error Log" or "Print Keystroke" function keys.
5. If the processing run was ended prematurely, return to the Main Menu, then select the "Edit Programs" function. "Enter" and "Edit" the program that was being used, entering a processing time of "0:00" for all stations for which processing was complete. Press the "Save" function key. This will return you to the Main Menu. To start the run over, press the "Tissue Processing" function key, select the program number, press the "Enter" function key, then the "Immediate Start" function key. After processing is complete, reedit the program to the original processing times.

# EXPLANATION OF SOFTWARE

## 2.3 Check Paraffin

Although the instrument will not allow paraffin pump-in to begin until 24 hours have elapsed after the power is initially turned ON, the following routine will override this function. If the retort and oven temperatures have reached the specified limit and you verify to the instrument that the paraffin is molten, you will be allowed to begin processing. If the oven temperature is below 57° C, an "OVEN TEMPERATURE IS TOO LOW" warning is given and tissue processing is not allowed.

1. From the Main Menu, press "Utility" and then "Check Paraffin". The display will change to display the prompt:

"VERIFY PARAFFIN HAS MELTED AND PRESS YES"  
 "PARAFFIN MAY NOT BE MELTED"

2. If the paraffin in all containers is melted, press "Yes" and the warning line will disappear. You will be allowed to begin processing when the display returns to the Utility screen. If it is not melted, press "Exit" and the display will return to the Utility screen with the Warning line still displayed.

**CAUTION: Do NOT attempt to begin processing unless the paraffin is completely melted. To do otherwise could cause extensive damage to the instrument.**

## 3. Solution Control

One of the first steps in setting up the instrument is to identify which solutions will be used at each station. To do this, press the "Solution Control" function key in the Main Menu. The "Solution Control" screen will be displayed (until reagents are entered, the default screen is nearly empty).

Solution Control					Jun 4- 9:18 am		Exit
Solution Control Method		# of cassettes					Solution Setup
Sta.	Solution	Conc. (%)	# Set (cassettes)	# Used (cassettes)	# Left (cassettes)		Name Solutions
1	Formalin	10.0	750	50	700		
2	Formalin	10.0	750	50	700		
3	Alcohol	70.0	750	50	700		
4	Alcohol	80.0	750	50	700		
5	Alcohol	80.0	750	50	700		
6	Alcohol	89.5	750	50	700		
7	Alcohol	100.0	750	50	700		
8	Alcohol	100.0	750	50	700		
9	Xylene	100.0	750	50	700		
10	Xylene	100.0	750	50	700		
11	Paraffin		750	50	700		
12	Paraffin		750	50	700		
13	Paraffin		750	50	700		
14	Paraffin		750	50	700		
15	Xylene		5runs	1runs	4runs		
16	Alcohol		5runs	1runs	4runs		
17	Water		5runs	1runs	4runs		
	Activated Carbon		20runs	1runs	19runs		Print List

Solution Control

The columns display or allow entry of, in order, the station number, solution or reagent name, and the concentration of the reagent. The column titled "#Set," represents how many processing cycles or cassettes each reagent should be used up to before being replaced. The next column, "#Used" shows the actual number of cycles performed or cassettes processed. The last column, "#Left", indicates how many additional runs or cassettes can be processed before reaching the Set Value. With each processing cycle, the number in the "#Used" column increments by one for each reagent or by the number of cassettes processed. If usage control is through the cassette count, the operator will be prompted to enter the number of cassettes being processed whenever a Start command is entered. The "#Left" column will automatically be adjusted.

To select the control method, press the "Solution Setup" key followed by the "Control Method" key. The message line will prompt: "CONTROL METHOD WILL BE CHANGED TO THE NUMBER OF CASSETTES PROCESSED. DO YOU WANT TO CHANGE?", or "CONTROL METHOD WILL BE CHANGED TO THE NUMBER OF RUNS COMPLETED. DO YOU WANT TO CHANGE?" depending on the current control method. Press "Yes" to change or "No" to keep the same control method. Note that the cleaning stations 15 through 17 and the Activated Carbon are only controlled using the "number of runs" method. That feature cannot be turned off to ensure that they will be refreshed regularly.

When the number in the "# Used" column equals the number in the "# Set" column, a screen labeled "Solutions" will be displayed, along with a message alerting the user to the need to replace one or more reagents. (The "Solutions" screen is identical to the "Solution Control" screen except for the message line and the presence of asterisks to denote which stations need to be exchanged.) The message does not prevent the run from continuing; if bypassed, the "# Used" counter will continue to increment and the message will be displayed again with the next run. The Solution Usage feature is optional and may be bypassed entirely by leaving the "# Set" counts blank or pressing "No Limit" to clear any previously set numbers. Press the "Save" key when finished.

If desired, up to 50 solution names can be created. In the Solution Control Menu, press the "Name solutions" function key to create solution names. Enter a code and then use the alpha-numeric keypad to enter each character to create the name. Pressing each key repeatedly will cycle through the characters shown. Use the right arrow key to insert a space and the left arrow key as backspace. Press "Caps Lock" to toggle between lower case and upper case characters.

Determine the reagents and concentrations that are to be located in each of the 14 processing stations and enter them into the instrument software, as instructed in the following steps. Note that the names for stations 15 through 17 and for the Activated Carbon cannot be changed. If desired, you can also input usage limits in the "#Set" column.

1. Press the "Solution Setup" function key and then the "Assign Solutions" key. The cursor will initially be located in the "Code" column of the selected station and the message line will prompt "SELECT NEW SOLUTION FROM SOLUTION LIST AND ENTER ITS NUMBER. PRESS ENTER". You can also select a solution by pressing the right arrow key and then using the up and down arrow keys to highlight the desired reagent. Press the "Enter" function key to select it. If no reagent name is needed for a given station press the "Not Used" function key. When all stations have been assigned, press the "Exit" key to continue the setup.

2. Use the right arrow key to select Conc.(%). The message line will prompt "ENTER SOLUTION CONCENTRATION (0.1-100.0)". Enter the concentration up to one decimal place. The concentration column can be set to any number from 0.1-100.0 or left blank using the "Blank" key.
3. Enter the "#Set" count for each solution. Press "No Limit" if you do not want to use this option for a given station. If you do wish to use the option, determine how many processing cycles or how many cassettes you want to run using the reagent at this station before exchanging or replacing the reagent. Enter this number (from 1-99) for runs and from 1-9999 for "Cassettes".

**NOTE:** For Stations 15 through 17, a "#Set" between 1 and 5 can be input. For the Activated Carbon the range is from 1 to 99. The "No Limit" function cannot be used for these four stations.

4. If there have been no processing runs on this instrument, the "# Used" column will all be "0" and there is no need to clear the counters. However, if runs have been performed and you plan to exchange the solution at this station, the "Clear Used count" key can be pressed to clear the "Used" count and begin again at "0." To access the "Clear Used Count" key, the cursor must be located in the Solution column. The operator has the option to clear all counters at once, only the ones that have reached the "# Set" number, or line by line.
5. Repeat Steps 1-4 above for each station from 2 to 10 and Steps 1, 3, and 4 for each station from 11 to 14 (the concentration of the paraffin in these stations is not set).

# EXPLANATION OF SOFTWARE

- When the cursor reaches the lines for Stations 15 through 17 and for the Activated Carbon, only the "# Set" column can be accessed. ONLY the reagents listed should be used at these stations, and they should always be changed after the listed number of cycles in order to ensure adequate cleaning and fume control. The three cleaning reagents must be changed at least every 5 cleaning cycles. To ensure proper fume control, the carbon filter cartridge must be changed on a regular basis, depending upon usage (refer to Section 6). Since there is no economical way to specifically monitor the remaining absorption capacity and/or capability of the Activated Carbon, changing the Activated Carbon after every 20 runs is recommended.
- The entries made on this screen are used as the basis for all Program screens, so examine the completed screen to ensure its correctness. The display will appear similar to the following example:

Solution Setup					Jun 4- 10: 15 am	
Solution Control Method: # of runs					Exit	
Sta	Solution	Conc. (%)	# Set (runs)	# Used (runs)	# Left (runs)	
1	Formalin	10.0	10	0	10	Assign Solutions
2	Formalin	10.0	10	0	10	
3	Alcohol	10.0	10	0	10	Clear Used Count
4	Alcohol	10.0	10	0	10	
5	Alcohol	10.0	10	0	10	Control Method
6	Alcohol	10.0	10	0	10	
7	Alcohol	10.0	10	0	10	
8	Alcohol	10.0	10	0	10	
9	Xylene	10.0	10	0	10	
10	Xylene	10.0	10	0	10	
11	Paraffin	10.0	10	0	10	
12	Paraffin	10.0	10	0	10	
13	Paraffin	10.0	10	0	10	
14	Paraffin	10.0	10	0	10	
15	Xylene		5 runs	0 runs	5 runs	Save
16	Alcohol		5 runs	0 runs	5 runs	
17	Water		5 runs	0 runs	5 runs	
	Activated Carbon		5 runs	0 runs	5 runs	

To select a solution name, press Assign Solutions.

Solution Setup

- When all reagent information has been properly entered, press the "Save" key to save the information into memory, then press "Exit" twice to return to the Main Menu.

## 4. Edit Programs

Up to twenty different processing programs can be entered into the software. The processing time and temperature can be set and the P/V cycle and Mix options turned ON or OFF for each station. The reagents and concentrations displayed for each station are determined by the selections previously made in "Solution Setup". To edit any or all of the twenty programs, press "Edit Programs" from the Main Menu and then select one program, using the arrow keys or the keypad. Then press "Enter". You can either edit a program, copy a program (section 4.2), or name a program (section 4.3). If the printer function is ON, you can also print the programs. To edit an existing program or to create a new one, press the "Edit" key.

The default conditions for the selected program will be displayed initially; the reagents and concentrations displayed are determined by those entered through the "Solution Setup" screen. For example:

Edit Programs							Jun 4- 10:58 am	
Program 1, Routine 1							Exit	
Sta	Solution	Conc. (%)	Time (hr:min)	Temp (°C)	P/V	Mix	All Stations	P/V Cycle
1	Formalin	10.0	1:00	--	ON	Fast		
2	Formalin	10.0	1:00	--	ON	Fast		
3	Alcohol	70.0	1:00	--	ON	Fast		
4	Alcohol	80.0	1:00	--	ON	Fast		
5	Alcohol	90.0	1:00	--	ON	Fast		
6	Alcohol	99.5	1:00	--	ON	Fast		
7	Alcohol	100.0	1:00	--	ON	Fast		
8	Alcohol	100.0	1:00	--	ON	Fast		
9	Xylene	100.0	1:00	--	ON	Fast		
10	Xylene	100.0	1:00	--	ON	Fast		
11	Paraffin	1:00	60	OFF	Fast			
12	Paraffin	1:00	60	OFF	Fast			
13	Paraffin	1:00	60	OFF	Fast			
14	Paraffin	1:00	60	OFF	Fast			

All Stations

End date Tomorrow (Jun 5-) Solution Manager OFF

End time 10:00 am

Enter processing time (00:00-99:59)

Edit Programs

**NOTE:** The default settings for each program are identical. If the same change is to be made to most or all stations, you can make the change in one step using the "All Stations" function (see instructions below). Also, after editing one program, you can copy that program to another, then make modifications to the copy (see "Copy" below).

1. The message line displays the prompt "ENTER PROCESSING TIME (00:00 -99.59)." Enter the desired processing time, in hours and minutes, for Station 1. A leading zero does not have to be entered for a single-digit hour; however, it does have to be entered for minutes of less than 10.

**NOTE:** If a time of "0:00" is entered or "Clear" is pressed for a station, that station will be skipped during the processing run; fluid will not be pumped into the retort.

2. Using the arrow keys, move to the "Temp" column. The prompt on the message line will display "ENTER PROCESSING TEMPERATURE (35-50°C). Enter the desired retort temperature for processing, from 35° to 50°C (95°-122°F).

**NOTE:** If you do not want to have added heat at a station, press "Clear."

3. The P/V cycle (alternating pressure and vacuum) can be turned **ON** or **OFF** for each station. Using the arrow keys, move the cursor into the "Time" or "Temp" column at the desired station. Press the "P/V Cycle" key to turn it off or on.
4. Using the "Mix Cycle" key, you can select either slow, fast, cont, or off for each station. When mixing is slow, the reagent will be pumped out of and back into the retort every 20 minutes. When fast, the cycle will occur every 12 minutes. The cycle will repeat until the "Remain Time" shows 30 minutes or more when slow is selected, or 22 minutes or more if fast is selected. If "continuous mixing" is selected, partial pump-in and pump-out cycles will be initiated followed by fast mixing cycles. The mixing action can also be turned OFF. The "Mix Cycle" key allows the selection of one of the four options.

5. Repeat Steps 1-4 above for each station from 2 through 14. All prompts will be identical, with exception of the prompt for processing temperature (Step 2) for Stations 11-14. The prompt for these stations will show an allowable range of 45-70°C (113-158°F), rather than 35-50°C (95-122°F); also the heat cannot be turned OFF for these stations.

**NOTE:** Check the melting temperature of the paraffin to be used before programming the processing temperature for Stations 11-14 to ensure an appropriate entry.

6. If the program is used with a delayed starting time, the End Date and Time are selected. The "end time" is the time at which you want the processing to be completed. The instrument then determines the "start time" by adding the processing times entered in the program and the times required for pumping each solution in and out, then subtracting the total from the selected "end time".

**NOTE:** Time continues to count down during the pump-in and pump-out operations of the mix cycle.

- a. Use one of the three function keys "Today", "Tomorrow," or "Day after Tomorrow" or enter the number of days using the numerical keypad.
- b. Using the arrow keys, access the "End Time" box. The message line will change to the prompt "ENTER THE DESIRED COMPLETION TIME." Enter the time at which you want the run to be completed.
- c. If the 12-hour format has been selected in the System Setup screen, use the "am/pm" key to select either AM or PM.

**Example:** If you want to program a run in which the retort is loaded on Monday, and you want processing to be completed on Tuesday at 8:00 am, you must enter "1" for the days or press "Tomorrow" and "8:00 am" for the time. For a run placed into the instrument on Friday to be completed on Monday at 1:30 pm, you must enter "3" for the days and "1:30 pm" for the time. The end date will be shown.

## EXPLANATION OF SOFTWARE

**NOTE:** If the processing times that were programmed earlier cannot be achieved by the end time just entered, the instrument will beep three times and the message line will momentarily display "CHECK PROGRAM. PROCESSING CANNOT BE COMPLETED AS PROGRAMMED." This message is dependent upon the **current** time. If you are editing the program for later use, simply verify that the times are all appropriate for your use and continue; the programmed end time will be accepted regardless. However, if the program is being edited **during** a processing run, or this message appears when attempting to start a new run, either the end time or one or more of the processing times must be changed in order to process in the Delay Mode.

7. For each program, the Solution Manager can be set ON or OFF. Use the arrow keys to access the Solution Manager Box. Then press the "On/Off" function key to select the desired operation. When turned ON, the Solution Manager will monitor pump-in error condition and try to use any compatible solution if a given reservoir station cannot be used. This allows to automatically bring a program to completion even if one of the station is not responding. Compatible solutions are solutions using the same name code as defined in the "Name Solutions" screen (Section 3, Solution Control).

**NOTE:** To allow for an automatic transfer of reagents during the processing run, the Solution Manager must be turned OFF.

8. Review the program carefully to ensure that all information is correct. Use the arrow keys to move the cursor to correct any errors. When finished, either press "Save" to store the information into memory, and to return to the Main Menu, or press "Exit" if you do not want to save the changes.

### 4.1 Program All Stations

This subfunction of the "Edit Programs" screen allows the user to quickly make the same change to all stations. It can be used for each of the four parameters that can be set in each program (time, temperature, P/V, and mixing). If only a few of the stations will be different, you can use this function to change them all, then modify those few stations as necessary.

1. To use this function, the display must be in the "Edit Program" screen. Then press "All Stations". The cursor will be located at the bottom of the column in which it was previously located (or under "Time" if it was located at the End time selection) and "**All Stations**" will be displayed at the left side of that line.
2. Use the < and > arrow keys to move the cursor to select the "Time" or "Temp" for change. Press the "P/V Cycle" or "Mix Cycle" function keys to change those selection. Then, press the "Enter" function key. All stations will then be changed to the values shown in the "All Stations" row.

**NOTE:** The entry for "Temp (°C)." column will affect only Stations 1-10; Stations 11-14 must be set individually through the normal "Edit Program" screen.

3. After the "Save" key is pressed, the display will return to the normal "Edit Programs" screen. Make any changes to specific stations at this time.

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## 4.2 Program Copy

This function, which is also a subfunction of the "Edit Programs" screen, can be used to copy one program to another. This is a convenient and quick way to set up a second program that will be very similar to another, with only a change, for example, in the end time or in the processing times.

1. To use this function, you must be in the "Edit Programs" screen, with the **old** program to be **copied from** on the display. To highlight the program, move the cursor to the desired program code line, using the ^ and v key. Press "Enter" and then "Copy".
2. Two message boxes will appear. The top box will have the message line "COPY PROGRAM FROM NUMBER". The cursor will move to the box next to the prompt "COPY PROGRAM TO NUMBER", and the message line will prompt "ENTER PROGRAM NUMBER TO BE COPIED TO. PRESS COPY." Enter the program number that you want to copy to and press "Copy." The program will then be immediately copied and the display will change to Edit Programs showing the newly created program. Press the "Save" function key to store this program into memory.

## 4.3 Name Programs

To name a program, press "Edit Programs" in the Main Menu Display. Enter a program number, or select one from the list using the arrow keys. Then, press "Enter". Press the "Name Programs" function key to name that program number. Use the alphanumeric keypad to create or modify a name. Use the right arrow key to insert a space and the left arrow key to backspace. Press "Caps Lock" to toggle between lower case and upper case characters. Press "Enter" when completed. The display will go back to the "Edit Programs" screen. Press the "Save" function key to store the name into memory.

# EXPLANATION OF SOFTWARE

## 5. Start Process

This menu selection is the starting point of each processing run. You cannot gain access to this operation unless the oven and retort temperatures are at the specified values, the retort is empty, the clean cycle has been completed, if necessary, and no errors exist. If any of these conditions are not met, four rapid beeps will sound and an appropriate message will be displayed on the "Warning" line at the bottom of the display.

1. To begin processing, press "Tissue Processing" from the Main Menu.
2. If the solution Control method selected is "Number of Cassettes", you will be prompted to enter a number from 1 to 300. If not, the instrument will display a Tissue Processing screen.

The screen will display the program number that was last used. If this is the desired program, press "Enter." If it is not, enter the desired program number and press "Enter." The Tissue Processing display will appear.

**Tissue Processing** Jun 4- 11:07 am

Experiment Number  Bottle Check  Solution Manager  OFF

Program  1 Routine 1 Automatic Transfer  OFF

Sta	Solution	Conc. (%)	Set Time	Time Left	Temp (°C)	P/V	Mix
1	User 1	20.0	1:00	1:00	--	ON	Fast
2	User 1	20.0	1:00	1:00	--	ON	Fast
3	User 2	70.0	1:00	1:00	--	ON	Fast
4	User 2	80.0	1:00	1:00	--	ON	Fast
5	User 2	90.0	1:00	1:00	--	ON	Fast
6	User 2	99.5	1:00	1:00	--	ON	Fast
7	User 2	100.0	1:00	1:00	--	ON	Fast
8	User 10	100.0	1:00	1:00	--	ON	Fast
9	User 10	100.0	1:00	1:00	--	ON	Fast
10	User 10	100.0	1:00	1:00	--	ON	Fast
11	User 45		1:00	1:00	80	OFF	Fast
12	User 45		1:00	1:00	80	OFF	Fast
13	User 45		1:00	1:00	80	OFF	Fast
14	User 45		1:00	1:00	80	OFF	Fast

Predicted end time for a delayed start: Jun 5- 10:00 am

Operation  Retort Temp.  35 °C Rotary Valve Temp.  70 °C

Retort  Ambient Oven Temp.  61 °C Gate Valve Temp.  34 °C

After backset and solution bottles are properly placed, start processing.

**Exit**

**Delay Start**

**Immediate Start**

**Experiment Number**

**Auto Transfer**

**Bottle Check**

Tissue Processing Display

3. If you wish to use an experiment number, press "Experiment Number". An experiment number of up to 8 alphanumeric characters can be entered. Then press, "Enter".
4. If you want the instrument to perform an automatic transfer during the processing run for a series of compatible reagents, press "Auto Transfer."

**NOTE:** Auto Transfer is not allowed if the Solution Manager has been turned ON. The Auto Transfer function key will not be displayed. To turn the Solution Manager OFF, go back to the Main Menu and select "Edit Programs" (Section 4, Edit Programs).

5. A bottle connection check is automatically performed whenever a delay start or an immediate start is selected. To disable that function for the next run, press "Bottle Check". The "Bottle Check" box will change to OFF.

When either start function is pressed, the first reagent of the program is pumped into the retort. The same program screen will be displayed.

The highlighted station indicates which reagent is in current processing use.

If the Start Mode was selected as "Immediate," the message line will indicate the instrument is in process and the program will begin to time down. The Operation (Pump In, Pump Out, Move Station) and condition under which the retort is operating (Vacuum, Ambient, or Pressure) are displayed, as are the Start time and Predicted End time.

If the "Delay" Start Mode was selected, "Tissue Processing (Delayed Start)" will display in the upper left corner of the screen until the VIP time-of-day display (upper right screen) matches the program Start time. The message line will then change to "[In Process]" and the conditions applied to the program (time, temperature, pressure/vacuum, mixing) will be active. Until that time match occurs, and if the control method selected is number of cassettes, the operator can add, remove or update the number of cassettes.

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## 6. Drain Retort

Once the processing run is complete, the retort will remain filled with the reagent from the last station for which time was entered in the program (generally, this will be paraffin). The retort must be drained and the specimen baskets removed. If paraffin has been pumped into the retort, the retort must also be cleaned (see "Clean Retort" below). If any processing mode or manual operation is attempted while the retort is not empty, the instrument will emit four rapid beeps and the warning "RETORT IS NOT EMPTY" will be shown.

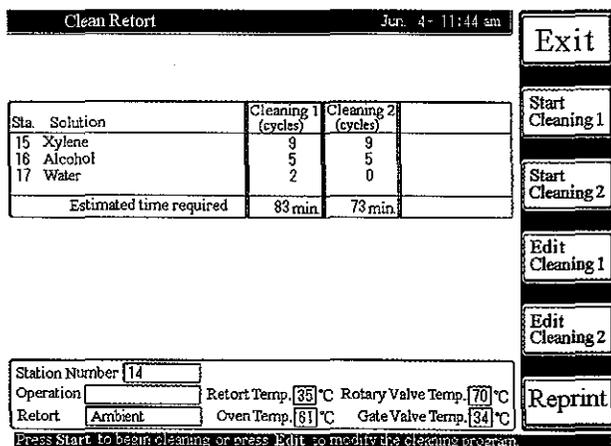
1. The display returns to the Process screen when a processing run is complete, and the message "DRAIN RETORT." is displayed. The last station at which processing was done is highlighted.
2. Press "Drain Retort".
3. The Pump-Out cycle will begin immediately. After the retort has been drained, the selected clean cycle will be displayed. Remove the specimen baskets from the retort before starting the Clean Cycle.

# EXPLANATION OF SOFTWARE

## 7. Clean Retort

Any time reagents from Stations 11-14 (paraffin) have been pumped into the retort (or a pump-in from these stations was attempted), the retort must be cleaned before any additional processing cycles can be started. However, the instrument will not require that a cleaning cycle be performed unless a station higher than Station 10 has been used.

**NOTE:** If paraffin was not pumped into the retort, the retort should be wiped out with a dry cloth regardless of whether or not a Clean Cycle is performed. This will ensure that remnants of the final reagent in the retort do not contaminate other reagents.



Sta.	Solution	Cleaning 1 (cycles)	Cleaning 2 (cycles)
15	Xylene	9	9
16	Alcohol	5	5
17	Water	2	0
Estimated time required		83 min	73 min

Station Number	14	Retort Temp.	38 °C	Rotary Valve Temp.	70 °C
Operation		Oven Temp.	81 °C	Gate Valve Temp.	34 °C
Retort	Ambient				

Press Start to begin cleaning or press Edit to modify the cleaning program.

Clean Retort Display

1. Verify that the number of cycles for the cleaning program you want to use is correct. If not, use the Edit function to modify either program. The range of cycles allowed are as follows:
  - Station 15 Xylene: 5-15 Cycles
  - Station 16 Alcohol: 2-15 Cycles
  - Station 17 Water: 0-15 Cycles
2. From the Clean Retort Display, press "Start Cleaning 1" or "Start Cleaning 2".
3. If cleaning is not necessary, or if you wish to delay performing the Clean Cycle, press "Exit." You will be prompted to enter the password to prevent unauthorized personnel from starting a run or changing the processing parameters. After entry of the password, the display will return to the Main Menu.

4. Upon pressing START, the following will occur:
  - a. A warming time of 10:00 minutes begins, during which time the retort is heated to 65° C (149° F) in order to melt the paraffin remaining in the retort. The display constantly updates the amount of time remaining.
  - b. After the warming time has elapsed, the instrument pumps out the melted paraffin from the retort into the last paraffin station for which processing time was programmed (generally Station 14).

**NOTE:** If paraffin had not been pumped into the retort, the instrument performs the pump-out cycle into the cleaning xylene (Station 15).

- c. The instrument then begins the first of the user-defined numbers of pump-in/pump-out cycles with xylene (Station 15). The number of cycles remaining is displayed on the screen.

**NOTE:** To interrupt the cleaning cycle in progress, press the "STOP" key or move the retort lock lever to the left.

- d. After all xylene cycles have been completed, the first of the user-defined number of alcohol cycles begins (Station 16). Again, the number of cycles remaining is displayed.
- e. After all alcohol cycles have been completed, the first of the user-defined number of water cycles begins (station 17). The number of cycles remaining is also displayed.
- f. After the final cleaning cycle has been completed, the display returns to one of two screens:
  - i. to the "Solutions" screen if there are any solutions that need to be exchanged (see "Exchange Solutions" below), or
  - ii. to the Main Menu if no solutions require exchanging.

## 8. Exchange Solutions

Reagents gradually become diluted and deteriorate after repeated use. To keep reagent purity consistent some users may wish to "rotate" their reagents . . . discard the first reagent of a particular group or set and then move the following reagents nearer to the beginning of the cycle or to be the first used reagent of that particular set. The reagent container which held the discarded reagent should be cleaned and/or rinsed with clean reagent. Then a full bottle of "new" reagent is placed at the end of that particular set of reagents (or that reagent grouping). The freshest reagent (or purest) of a group will always be the final reagent to complete that particular chemical exposure to or infiltration of the specimens.

This process can be done manually by physically changing the bottle locations, or it can be done automatically by the instrument through the "Auto Transfer" Mode. In this mode, the reagent solution will be rotated automatically during a processing run or on request.

If a "Set" count was entered through the "Solution Setup" screen, the software will automatically notify you when it is time to exchange solutions. When the number of runs performed or the number of cassettes processed (# Used) equals the number of runs or cassettes selected (# Set), the "Solutions" screen will be displayed, with each station requiring exchange denoted by asterisks (\*) at both the beginning and the end of the display line. (The "Solutions" screen is identical to the "Identify Solutions" screen except for the message line and the asterisks.) This notification includes Stations 11-16 and the active carbon, even though automatic transfer cannot be done for these stations.

To use the automatic transfer feature during a processing run, follow these steps:

1. From the Main Menu, press "Edit Programs" and turn the Solution Manager box to OFF. Save the modified program.
2. From the Main Menu, press "Tissue Processing" and enter a program number. The Select Processing display will appear.

3. Press the "Auto Transfer" key. The cursor will access the Automatic Transfer box and the message line will prompt: "Enter the first station number to be transferred. Press Enter."

4. The message line will then prompt "ENTER THE LAST STATION NUMBER TO BE TRANSFERRED. PRESS ENTER." If the selected first and last stations are compatible, the Automatic Transfer box will display these station numbers and the display will go back to the Start Processing display.

**NOTE:** Verify that the waste bottle in station 18 is empty before proceeding.

5. To perform an automatic transfer when a processing run has not been started, select "Solution Control" from the Main Menu. Press "Exchange Solutions" and then "Auto Transfer". The process is as previously described above.

6. During a processing run, when an immediate or a delayed start is selected, the transfer cycle will be automatically performed, as in the following example.

- a) Assume that the first station selected is 3 and the last one is 6. During the run, reagent in station 3 will be pumped in the retort according to the program. When the Set Time for that station has reached "zero," the solution will be pumped out in station 18, the Waste station. The bottle in station 3 will then be empty.

- b) The reagent in station 4 will then be pumped in the retort as programmed. At the end of the Set Time, the reagent will then be pumped out in Station 3. The same scenario will happen for stations 5 and 6.

- c) At the end of the transfer cycle, station 6 will be empty and station 18 will be full. At the end of the processing run, the operator will be alerted of the need to fill station 6 and empty station 18. This can be accomplished manually or using the external drain and fill feature.



# OPERATING INSTRUCTIONS

## Section 4

### Routine Operation

Once the instrument software has been customized for your laboratory needs, the Tissue-Tek® VIP™ 5 Vacuum Infiltration Processor is ready for use in routine processing. The instrument is designed to be left on at all times, as this maintains the oven temperature to prevent solidification of the paraffin. This section provides the steps to follow for each processing run.

1. Ensure that the retort is drained and the Clean Cycle has been run if paraffin was pumped into the retort during the previous run (see Steps 7 and 8 below). These steps must be performed before the instrument will allow a new processing run to be performed.
2. Prepare the specimens for processing as follows:
  - a. Properly fill and seal the Tissue-Tek® Cassettes, ensuring that there is a sufficient ratio between the size of the specimen and the volume of the cassette.
  - b. Place the divider into the sample basket, then load the cassettes with the slanted end up (Figure 4-1). Each partition holds up to ten cassettes. Cover the basket with the basket lid. Fill the other baskets if applicable.

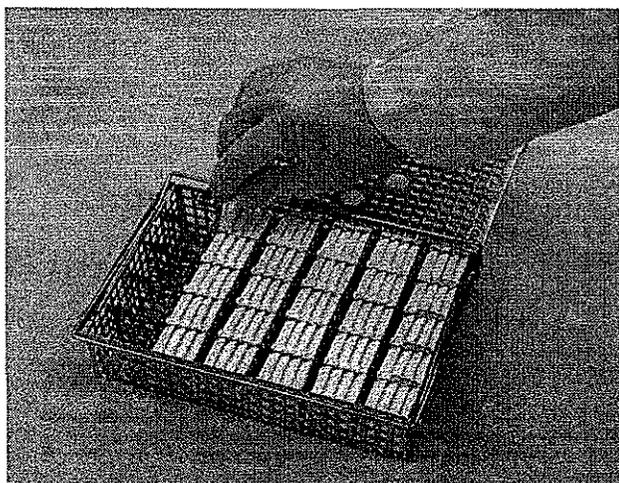


Figure 4-1

- c. Open the retort by sliding the retort bar to the left and unhooking the retort latch. Place the basket(s) into the retort, rotating the handles so they lay flat against the retort sides. Close and latch the retort lid, then slide the retort bar to the right. Make sure the message "RETORT LID UNLOCKED" has disappeared from the display.

**NOTE:** Before loading the retort, check that it is empty of any liquid and that the inside is clean.

**NOTE:** The instrument can be loaded with either up to 150 cassettes, or up to 300 cassettes per load. To run the instrument for up to 150 cassettes (Figure 4-2), two **displacement blocks** must be placed inside the bottom basket ①. Reagent volumes in stations 1 through 14 should be at least 2.7 L. **When running up to 300 cassettes, the displacement blocks are not used and the reagent volumes must be at least 3.7 L.**

**NOTE:** The operator has the option of selecting one of two reagent fill volumes for all applicable stations. The operator can select the "Normal" fill volume at 3.7 L or the "Full" fill volume at 4.5 L, when used for 300-cassette processing. When used for 150-cassette processing, the "Normal" fill volume is 2.7 L and the "Full" volume is 3.5 L of reagent. The "Full" fill volume is selected when a higher ratio of reagent to tissue specimens is desired.

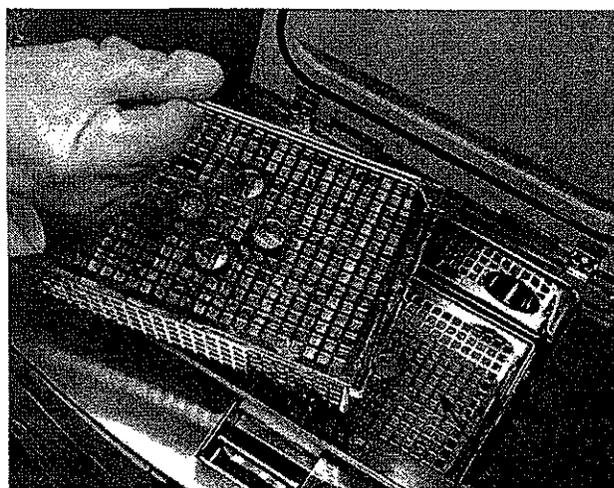


Figure 4-2

①

# OPERATING INSTRUCTIONS

3. Press "Tissue Processing" from the Main Menu. The Program Selection screen will be displayed. If the Control Method used is "# of cassettes," you will be prompted to enter a number from 1 to 300. Use the "Deleted Input" key to correct any error. Enter the desired program number. The Start Processing screen will be displayed.
 

**NOTE:** If any solution has been used for the set number of runs or cassettes, the "Solution Control" screen will be displayed, a dash (—) placed to the left side of the solution name for those stations that are due for exchanging. The message line will prompt "PRESS EXCHANGE SOLUTIONS TO EXCHANGE. UPDATE SOLUTION CONTROL INFORMATION."

  - a. To exchange the solutions using the External Drain and Fill Mode, press "Exit" twice to return to the Main Menu, then press "Solution Control" and then "Exchange Solutions". **Be sure to remove the specimen baskets before starting the exchange.**
  - b. If you wish to begin processing without exchanging the solutions, press "Exit"; the used count will continue incrementing. Again, the Tissue Processing screen will be displayed; however, the used count will not be cleared.
4. Select the number of the program you want to use, or enter its number, then press "Enter".
5. Tissue Processing Screen will appear. If a bottle connection check is not required, press the "Bottle Check" key to turn it off. If reagents need to be automatically transferred during the run, press the "Auto Transfer" key. This key will not appear if the Solution Manager is turned ON for that program (Section 8, Exchange Solutions). Press the "Experiment Number" key to input a number, if desired. Then, select either "Delay Start" or "Immediate Start".
6.
  - a. If "Immediate Start" was selected, the Tissue Processing Screen will appear. The current time will be displayed as the "Start Time" and the predicted "End time" will be calculated and displayed on the line above the system status area. The rotary valve will turn to Station 1, if necessary, and processing will begin immediately, starting with Station 1 (or the first station for which time is programmed).
  - b. If "Delay Start" was selected, the screen will show "Delay Start" at the top, and the Start Time and predicted End Time will be displayed. The rotary valve will turn to Station 1, if necessary, and the reagent in Station 1 (or the first station for which time is programmed) will be pumped into the retort to prevent deterioration of the samples. When the Start Time is reached, processing will begin; the screen display will change to the "Process Monitor Screen".
7. When processing is complete, the message line will display "PROCESS COMPLETED. PRESS "DRAIN RETORT" AFTER BASKETS ARE REMOVED." The instrument will beep intermittently for approximately 30 seconds. The highlighted bar will remain on the final station for which time was entered in the program.
8. After removing the baskets, the message line will display "PRESS DRAIN RETORT." A pump-out cycle will begin immediately after pressing the "Drain Retort" key.

9. The display will then show the screen for the Clean Retort Cycles, with the prompt "PRESS START TO BEGIN CLEANING OR PRESS EDIT TO MODIFY THE CLEANING PROGRAM". If not already done, open the retort and remove the basket(s) of specimens. Use the plastic scraper to scrape any solidified paraffin from the sides and lid of the retort. If desired, replace the **empty** baskets into the retort for cleaning. Close the retort, then press "Start Cleaning 1" or "Start Cleaning 2" to begin the Clean Cycle. When the Clean Cycle is complete, the screen will request entry of the password to prevent unauthorized access to the instrument; after the password is entered, the Main Menu will be displayed.

**NOTE 1:** Metal items, such as base molds and forceps, may also be placed in the retort for cleaning. However, if additional items are cleaned in this manner, the cleaning reagents (Stations 15, 16 and 17) may have to be replaced more often.

**NOTE 2:** If reagent from any of Stations 11-14 was pumped into the retort, the Clean Cycle **must** be performed before another processing run can be started. However, if paraffin has not been used, and you do not wish to perform the Clean Cycle, press "Exit." The software will then require you to enter the password in order to bypass the Clean Cycle. After entering the password and pressing "Enter," the Main Menu will be displayed. Wipe out the retort with a dry cloth before performing another processing run if the Clean Cycle was not performed; this will help prevent contamination of the reagents from remnants of the final reagent pumped out of the retort.

## Interrupting the Run

A processing run can be interrupted, for example, in order to edit the program or discontinue the run. If the run is not discontinued, processing can be started again after the editing function by pressing "Resume."

1. To interrupt a run that is either processing or in the Delay mode, press the "Hold" key. If a pump-in or pump-out operation is in progress, the instrument will complete the operation before stopping and returning the retort to an ambient condition. The message line will then prompt "ENTER PASSWORD OR PROCESSING WILL RESUME IN 30 SECONDS." You must enter the password within 30 seconds or processing will begin again. Enter the password and press "Enter", or press "Resume" to continue the run.

**NOTE:** The instrument does not adjust for the length of time of the interruption. The "Time Left" will not count down if a run was in progress.

**NOTE:** A processing run can also be interrupted by pressing the "STOP" key or sliding the retort lock lever to the left. The instrument would then stop immediately and return the retort to an ambient condition. Any pump-in or pump-out operation in progress, will be stopped immediately.

2. If a valid password is entered, the display will change to the "Hold" screen:

**NOTE:** If the run was interrupted while the instrument was in the standby position of the delayed start routine, an "Immediate Start" key will also be shown, allowing to bypass the delay.

3. Press the appropriate function key for the desired action. Each function is explained below. The screens displayed and the operation of each function are identical to those seen in the routine operation when it is selected from the Main Menu.

Hold Jun 4- 11:07 am

Experiment Number  Bottle Check  ON Solution Manager  OFF

Program  1 Routine 1 Automatic Transfer  OFF

Sta.	Solution	Conc. (%)	Set Time	Time Left	Temp (°C)	P/V	Mix
1	User 1	20.0	1:00	1:00	--	ON	Fast
2	User 1	20.0	1:00	1:00	--	ON	Fast
3	User 2	70.0	1:00	1:00	--	ON	Fast
4	User 2	80.0	1:00	1:00	--	ON	Fast
5	User 2	90.0	1:00	1:00	--	ON	Fast
6	User 2	99.5	1:00	1:00	--	ON	Fast
7	User 2	100.0	1:00	1:00	--	ON	Fast
8	User 10	100.0	1:00	1:00	--	ON	Fast
9	User 10	100.0	1:00	1:00	--	ON	Fast
10	User 10	100.0	1:00	1:00	--	ON	Fast
11	User 45		1:00	1:00	60	OFF	Fast
12	User 45		1:00	1:00	60	OFF	Fast
13	User 45		1:00	1:00	60	OFF	Fast
14	User 45		1:00	1:00	60	OFF	Fast

Predicted end time for a delayed start: Jun 5- 10:00 am

Operation  Retort Temp.  35°C Rotary Valve Temp.  70°C

Retort  Ambient Oven Temp.  81°C Gate Valve Temp.  34°C

After baskets and solution bottles are properly placed, start processing.

Buttons: Resume, Abort, Edit Programs, Error List

Hold Display

# OPERATING INSTRUCTIONS

## Edit Programs

If "Edit Programs" is selected, the display will change to the Edit screen for the program being used for the processing run. The time, retort temperature, P/V, or mixing selections can be changed for any station not yet completed; in addition, the end time can be changed. When all necessary changes have been made, press "Save" to return to the Hold screen. If "Exit" is pressed, changes are not kept.

**NOTE:** The changes made affect **only** the current processing run; they do not affect the parameters stored in memory for the program.

## Error List

The Error List screen can be displayed by selecting "Error List" from the Hold Menu. This allows the user to determine what errors may have occurred and, with certain errors, to correct the condition causing the error before processing is delayed further. Refer to Section 7, TROUBLESHOOTING, for complete information on the displayed errors. Press "Exit" to return to the Hold Menu.

## Resume

Processing will continue from the point at which it was interrupted. The instrument does not adjust the Remain Time for the length of time that elapsed while the instrument was on Hold.

## Immediate Start

If the instrument was put on Hold during the delay portion of a Delay Start process, an immediate start can be forced by pressing the "Immediate Start" key.

## Abort Processing

The processing run can be discontinued by selecting this option. The message line will prompt "DO YOU WANT TO ABORT THE PROCESS?" A response of No returns the display to the Hold Menu with the original message line prompt of "THE DELAYED START HAS BEEN INTERRUPTED." Responding YES will end the processing run and return the display to the Main Menu. If the retort is not empty, the message "RETORT IS NOT EMPTY." will be flashed on the Warning line and the alarm will sound for 10 seconds (repeating every minute). To silence the alarm, press "ALARM OFF." The retort must then be drained using the "Drain Retort" function of the "Manual Operations" screen (Section 2, Utility Functions).

4. Unless the process was discontinued, it can be restarted simply by pressing "Resume" from the Hold Menu. Processing will continue from the point at which it was interrupted. The instrument does NOT adjust the Remain Time for the length of time that elapsed while the instrument was on hold.

## Recommendations for Efficient Operation

### Specimen Placement

Proper placement of tissue specimens into the basket is vital for acceptable processing results. Improper placement can result in inadequate reagent penetration and in reagent cross-contamination. For optimal results:

1. Tissue samples must be small enough to allow sufficient clearance between the tissue and the cassette interior. This will ensure good flow of reagents on all sides of the tissue.
2. Use the vertical divider in the specimen basket.
3. Place cassettes in the basket with their slanted end facing up, rather than laying them flat.
4. Cover the baskets with their lids to prevent cassettes from floating free in the retort.

### Solution Replacement and Exchange

The schedule for replacement and/or exchange of reagents varies from one laboratory to another; the volume of processing is the best indicator of the timing. Solution replacement can be done either manually, by physically emptying and filling the bottles, or automatically through the External Drain and Fill mode. Rotation of reagents can also be done either manually, by physically moving the bottles from one station to another, or automatically, through the "Auto Transfer" Mode.

### Paraffin Replacement

The paraffin containers are designed to be removed from the oven for filling and should be filled with previously-melted paraffin or unmelted paraffin flakes or chips. Carefully observe the fill line, and do **NOT** overfill. When transferring paraffin from one container to another, hook the lip of the pouring container over the edge of the receiving container. Pour molten paraffin slowly and carefully.

**WARNING: OVEN AND PARAFFIN CONTAINERS ARE HOT!  
USE EXTREME CARE.**

### Replacement of Fume Control System Materials

The water in the water bottle absorbs formalin and alcohol vapors from the exhaust fumes. **Change the water daily** to maintain efficient fume control.

The activated carbon in the carbon cartridge absorbs the remaining xylene and alcohol vapors present in the exhaust fumes. To maintain a high level of fume control, change the cartridge at least once a month (after 20 processing runs).



# ACCESSORIES

## Section 5

### Tissue-Tek® Uni-Cassette® Tissue-Tek® Process/ Embedding Cassettes

The Tissue-Tek Uni-Cassette cassettes (Figure 5-1) are self-contained units with an attached lid that is removed prior to embedding with paraffin. The Process/Embedding Cassettes are designed for use with reusable metal lids, such as Tissue-Tek Process Covers. Tissue-Tek Cassettes are available in a variety of colors and styles.

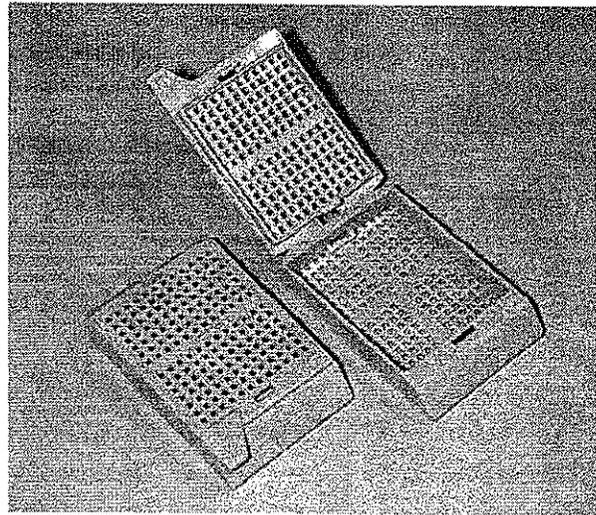


Figure 5-1

### Tissue-Tek® VIP™ Activated Carbon Cartridge (Product No. 4899)

The Tissue-Tek VIP Activated Carbon Cartridge (Figure 5-2) is made specifically for use with the Tissue-Tek VIP Vacuum Infiltration Processor. It is self-contained for easy insertion and disposal. Two per package.

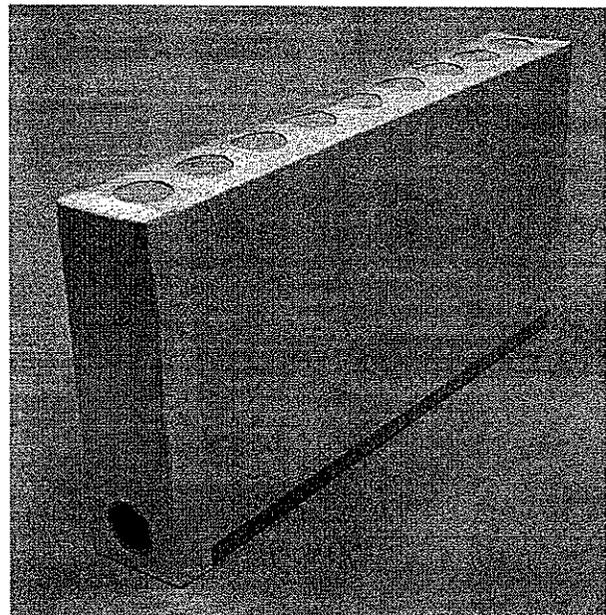


Figure 5-2

## ACCESSORIES

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<b>Paraffin Scraper</b> (Product Code 1550)	Used to scrape paraffin off the retort.
<b>Basket Transport Tray</b> (Product Code 5264)	Convenient to transport cassette baskets to and from the Tissue-Tek VIP 5 without dripping reagents.
<b>150-Cassette Basket with Dividers and Handles</b> (Product Code 5265)	Choose between four different styles to fit your workflow. Compatible with all models of Tissue-Tek VIP Tissue Processors and Tissue-Tek TEC Tissue Embedding Centers.
<b>65-Cassette Basket with Dividers and Handles</b> (Product Code 5266)	
<b>150-Cassette Basket with Dividers</b> (Product Code 5267)	
<b>75-Cassette Basket with Dividers</b> (Product Code 5268)	
<b>Basket Hook</b> (Product Code 5269)	To be used with Product Code 5267.
<b>Basket Hook</b> (Product Code 5270)	To be used with Product Code 5268.
<b>Individual Basket Dividers</b> (Product Code 5271)	Allows the partitioning all VIP 5 baskets even further. Six per package.
<b>Reagent Bottle</b> (Product Code 5272)	Complete with cap and connector.
<b>Reagent Bottle Labels</b> (Product Code 5273)	Color-coded labels for 150-cassette or 300 cassette operation. Reagent information can be inscribed using a felt pen.
<b>Paraffin Container</b> (Product Code 5274)	Contains either 2.7L or 3.7L of molten paraffin.
<b>Displacement Blocks</b> (Product Code 5275)	Used in the 150-cassette operation. Must be put into a 150-cassette basket and placed underneath the basket containing tissues. Three per package.
<b>Drain/Fill Hose</b> (Product Code 5276)	Used to perform an external drain or fill operation.

**Printer** (Product No. 4397) (Not Shown)

A printer can connect to the VIP 5 instrument ① (Figure 5-3). Once installed, the printer will provide a hard-copy printout of the program being used and any errors that occur, as well as several other screens.

**Uninterruptible Power Supply**

(UPS not sold through Sakura)

An Uninterruptible Power Supply can be connected to the UPS Connector ② (Figure 5-3) on the rear of the VIP 5. (Note that the UPS connector is a signal connector only.) The UPS unit supplies power to the VIP 5 in case of power outage occurrence.

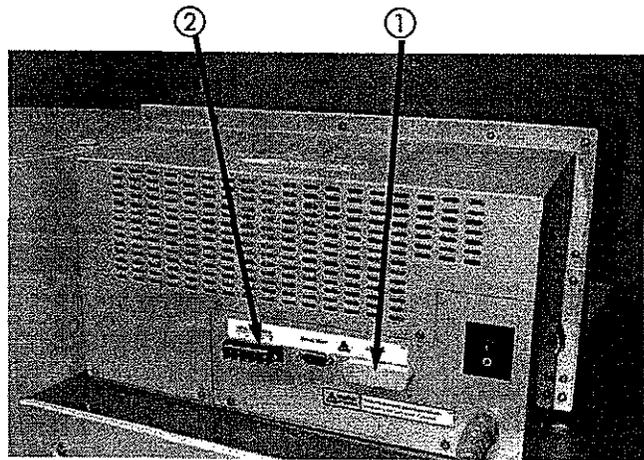


Figure 5-3



# CARE OF THE INSTRUMENT

## Section 6

### General Maintenance

Keep the exterior of the instrument free of dust. Remove hardened paraffin using a plastic scraper. If needed, gently clean the remaining paraffin with a cloth **lightly** moistened with xylene, then wipe with a dry cloth. Do not use solvents of any kind on the front of the control panel; however, if disinfection of the keypad is desired, 70 to 85% ethanol or isopropanol can be wiped on and allowed to air dry. The glass doors may be cleaned with a glass cleaner and soft cloth. Keep the inside of the reagent cabinet clean by wiping with a clean cloth.

### Daily Maintenance

#### Retort

1. Clean the inside of the retort lid, the rim of the retort, and the retort lid gasket by wiping with a clean cloth. After cleaning, inspect the gasket carefully for cracks, splitting, tearing, or other signs of deterioration that could cause leaks. Replace the gasket if necessary, as instructed in Section 8, MINOR REPAIR.

2. Clean the outlet filter in the retort floor, as follows:
  - a. Grasp the protruding part of the filter and unscrew it counterclockwise. (Figure 6-1), then remove it from the retort.



Figure 6-1

- b. Remove any debris, then thoroughly clean the filter by soaking in xylene. Clean the retort floor by wiping with a cloth moistened with xylene. Reinstall the filter.

#### Fume Control System — Water Bottle

Remove the WATER bottle from the storage cabinet and dispose of its contents. Refill to the proper level (2.5 L to 3.0 L) with tap water and replace into the reagent cabinet.

#### Exterior Surfaces

Daily clean the control panel, plastic, and painted areas by wiping with a clean cloth moistened with mineral oil. Daily clean the inside of the reservoir storage compartment by wiping with a clean cloth.

# CARE OF THE INSTRUMENT

## Weekly Maintenance

### Reagent Exchange and Warm Water Flush

1. All the reagents should be replaced or exchanged on a weekly basis. If replacing, empty each bottle and refill it with the appropriate concentration of fresh reagent. If exchanging, empty the first bottle of each reagent type, then move the remaining reagents up one station each (see "Auto Transfer" in Section 3).
2. Unless the Tissue-Tek VIP Formalin reagent is used, other commercial formalin (generally in Stations 1 and 2) and the first alcohol (generally Station 3) become contaminated with precipitated formalin salts. These salts also create blockages in the lines and in the rotary valve. Therefore, the formalins and the first alcohol should be replaced, rather than exchanged, on a weekly basis. While replacing these reagents, a warm water flush should be performed to dissolve any salt buildup in the lines and on the rotary valve:
  - a. Discard the contents of each bottle of formalin and the first bottle of alcohol (generally Stations 1-3). Rinse each bottle with tap water, then fill each to the appropriate line with warm tap water. Reinstall the bottles into the appropriate stations.
 

**NOTE:** Stations 1 through 5 can be selected for a warm water flush procedure.
  - b. From the main Menu, press the "Cleaning" key and then the "Warm Water Flush" key. The message line will prompt "IF THE WARM WATER BOTTLE IS IN PLACE, PRESS START." If desired, the program can be modified by pressing the "Edit" key. If "Start" is pressed, the warm water from the first station in the program will be pumped-in the retort and pumped back out in the same bottle. The same action will take place automatically for all programmed stations.
  - c. When water has been pumped from all appropriate stations, discard the water from each bottle and fill with the appropriate concentration of fresh reagent. Replace the bottles into their appropriate stations, ensuring a secure connection.

### Clean Cycle Reagents (Stations 15, 16 and 17)

The xylene, alcohol and water used in the Clean Cycle will quickly become contaminated with residual paraffin; therefore, **these reagents need to be replaced after every five uses.** (If local regulations require the use of a xylene substitute, it should be replaced more often; also, extra cleaning cycles may be needed to attain proper cleaning.) Discard the contents of each bottle in an appropriate manner, then fill with fresh reagent to the appropriate line. Reinstall the bottles into their proper stations, ensuring a secure connection.

## Periodic Maintenance

### Fume Control System — Activated Carbon Cartridge

Replace the activated carbon cartridge on a regular basis. The recommended schedule is once a month (assuming five processing runs per week); however, this will vary depending upon the frequency and duration of your runs and on the reagents used. Remove the old cartridge located behind the panel on your left and replace with a new cartridge (Product No. 4899). Press the cartridge firmly into place to ensure a proper seal. Dispose of the used cartridge according to your local regulations.

**CAUTION: The used carbon cartridge contains xylene fumes; dispose of these cartridges with proper care.**

### Overflow Bottle

The overflow bottle, located behind the rear left panel on the control module when viewed from the front, should be inspected periodically (once or twice a year) for fluid buildup.

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## Bottle Connectors

Carefully inspect all bottle caps for cracks and worn threads. Inspect the bottle connection fitting for cracks and deterioration. An initial indication of a connection problem will be the loss of bubbling in the WATER bottle during fluid transfer operations and/or failure of the bottle connection check. Replace bottles that are cracked or deteriorated (see Section 9, "Replacement Parts").

## Disinfection

Under normal operating conditions, the instrument is effectively disinfected each time the Clean Cycle is performed. However, if a malfunction of the pump occurs and normal pumping cycles cannot be accomplished, the instrument can be disinfected, if necessary, by the following procedure:

1. Spray or wipe a thick coating of 70 to 85% ethanol or isopropanol onto the walls and base of the retort and the inside of the retort lid. Do not use absolute (100%) alcohol, as this is a less effective disinfectant than is a concentration of 70 to 85%.

**NOTE:** The use of sodium hypochlorite (i.e., bleach) is **not** recommended, since any residue in the retort can contaminate the reagents and tissues.

2. Allow the alcohol to air dry before closing the retort lid.



# TROUBLESHOOTING

## Section 7

### General Information

The following Troubleshooting Chart lists the warning messages and error codes that could occur during operation of the Tissue-Tek® VIP™ 5 instrument. Possible problems could be electrical, mechanical, or operational. Probable causes and recommended remedies are also included, so that many isolated problems can be quickly corrected.

If additional assistance is required concerning an instrument problem, or if the problem cannot be isolated or is beyond the scope of this manual, complete the "Preservice Checklist" in Section 9. Then contact the Customer Support Department of Sakura Finetek U.S.A., Inc., by calling toll free **1-800-725-8723** (U.S. only). If located outside the United States, contact the nearest Tissue-Tek instrument distributor or representative for information and assistance.

When an error is detected, an alarm sounds for about 10 seconds, repeating every minute until the error is cleared. The error number or warning message is flashed repeatedly on the "Warning" line of the display. If the instrument is left unattended for longer than five minutes, an external alarm, if connected, is activated. To stop the internal alarm, press the "ALARM OFF" key. To turn off the external alarm, slide the retort bar to the left and then to the right. To view a description of the error messages, press the "Utility" key from the Main Menu. Press "Error Information", then "Error List", then "Error Description".

# TROUBLESHOOTING

## TROUBLESHOOTING CHART

WARNING MESSAGE	DESCRIPTION	REMEDY
Battery voltage low	All user-selected programming, such as reagents and programs, are maintained by the backup battery if a power outage occurs. If power is lost and the battery voltage is insufficient to provide this backup, then all user-selected programming will be lost.	Contact Customer Support to have a new battery installed. Do not turn your instrument OFF until the battery is replaced to ensure that your programming remains in memory.
Paraffin not melted	Displayed when the instrument is first turned ON or when there has been a power outage in which the oven temperature has dropped by greater than 10° from the set temperature. Will continue to be displayed for a preset length of time, up to 24 hours.	When the oven temperature reaches its set temperature, this warning can be overridden through the Utility Menu option of "Check Paraffin" (see Section 3). Ensure that the paraffin in each tank is completely melted before overriding the warning.
Power out	Power to the instrument has been interrupted because of a power outage, the power switch was turned to OFF, or the line cord was unplugged.	Power has already been restored when this warning is displayed. Operation continues immediately unless the oven or retort temperatures have fallen below the acceptable limit, in which case an additional delay may occur. (See "Paraffin not melted" above.) The end time for the processing run may be (or have been) delayed. <b>To clear the warning from the display, slide the retort bar to the left and then to the right.</b>
Retort dirty, Clean retort	The retort has not yet been cleaned following a processing run in which reagent from Stations 11-14 was pumped in.	Perform a Clean Cycle by selecting "Cleaning" from the Main Menu.
Retort is not empty	Processing was discontinued while there was reagent in the retort	Drain the retort by selecting "Manual Operations" from the Utility Menu, and then "Drain Retort".
Retort lid unlocked	The retort bar is in the "open" position (to the left). No processing operation (automatic or manual) will occur unless the retort bar is closed. If the bar is opened while the instrument is operating, an alarm will sound for ten seconds, repeating every minute.	Be sure the retort lid is securely clamped, then slide the retort bar to the right.

ERROR CODE	DESCRIPTION	POSSIBLE CAUSE	REMEDY
1	Retort overflow during a P/V cycle	<ol style="list-style-type: none"> <li>1. A reagent bottle contains too much liquid.</li> <li>2. There are too many specimens in the retort.</li> <li>3. Fluid from an external source was poured into the retort.</li> <li>4. Overflow bottle is misadjusted or overflow sensor was touched or is misadjusted.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill bottles to the correct level for the instrument model being used.</li> <li>2. Reduce the number of specimens in the retort; do not process more than the recommended number.</li> <li>3. Open retort and remove excess fluid to below the fill line (etched on either side of retort), then close retort. Place an empty bottle at the highlighted station and perform a manual pump-out of the retort.</li> <li>4. Perform a manual pump-out. If error repeats, contact Customer Support for further information.</li> </ol>
2	Retort overflow during other than a P/V cycle or pump-in	<ol style="list-style-type: none"> <li>1. The instrument was moved while fluid was in the retort, causing a "false" overflow.</li> <li>2. Overflow bottle is misadjusted or overflow sensor was touched or is misadjusted.</li> </ol>	<ol style="list-style-type: none"> <li>1. Do not move the instrument when there is fluid in the retort.</li> <li>2. Perform a manual pump-out. If error repeats, contact Customer Support for further information.</li> </ol>
3	Power outage	There was a power outage at some point during the processing cycle.	Refer to "Power Out" warning above. Before continuing the run, check that the paraffin is molten after the retort and oven temperatures have stabilized.
10	Retort overflow during the pump-in cycle	<ol style="list-style-type: none"> <li>1. A reagent bottle contains too much liquid.</li> <li>2. There are too many specimens in the retort.</li> <li>3. Fluid from an external source was poured into the retort.</li> </ol>	<ol style="list-style-type: none"> <li>1. Perform a manual pump-out, then fill all bottles to the correct level for the instrument model being used.</li> <li>2. Reduce the number of specimens in the retort; do not process more than the recommended number.</li> <li>3. Open retort and remove excess fluid to below the fill line (etched on either side of retort), then close retort. Place an empty bottle at the highlighted station and perform a manual pump-out of the retort.</li> </ol>
11	Pump-in not complete after 6 minutes, or bottle connection check has failed.	<ol style="list-style-type: none"> <li>1. Reagent bottle is not securely connected to quick-release connector.</li> <li>2. Air line or reagent transfer line is plugged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reconnect the bottle at the station listed, ensuring a secure connection of the quick-release connector to the bottle.</li> <li>2. Contact Customer Support for further information.</li> </ol>

# TROUBLESHOOTING

ERROR CODE	DESCRIPTION	POSSIBLE CAUSE	REMEDY
12	Pump-in not complete after 3 attempts of 6 minutes each	Refer to Error #11.	Refer to Error #11.
13	Unable to establish pressure or vacuum inside the retort	<ol style="list-style-type: none"> <li>1. Retort clamp is not in position.</li> <li>2. Retort gasket is leaking.</li> <li>3. A line connection or union is loose.</li> <li>4. Instrument malfunction.</li> </ol>	<ol style="list-style-type: none"> <li>1. Close the Clamp by pushing firmly on the handle (refer to Section 2, "Instrument Setup").</li> <li>2. Clean and reposition the retort gasket, as instructed in Section 6. If gasket appears cracked or worn, replace as instructed in Section 8.</li> <li>3. Contact Customer Support for further information.</li> <li>4. Contact Customer Support.</li> </ol>
14	Unable to establish vacuum from reagent bottle or paraffin tank	<ol style="list-style-type: none"> <li>1. Reagent bottle is empty.</li> <li>2. Paraffin tank (Stations 11-14) is not securely connected.</li> <li>3. Instrument malfunction.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill the bottle with the appropriate reagent to the proper fill line.</li> <li>2. Reconnect the tank at the station listed, ensuring a secure connection at the back of the tank.</li> <li>3. Contact Customer Support.</li> </ol>
20	Pressure cannot be achieved in 1 minute with the rotary valve closed	Refer to Error #13.	Refer to Error #13.
21	Pressure cannot be achieved after 3 attempts of 1 minute each with the rotary valve closed	Refer to Error #13.	Refer to Error #13.
22	Pump-out not complete after 2 attempts of 6 minutes each	<ol style="list-style-type: none"> <li>1. Reagent bottle or paraffin tank is not securely connected.</li> <li>2. Retort inlet/outlet filter is plugged.</li> <li>3. Air line or reagent transfer line is plugged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reconnect the bottle or tank at the station listed, ensuring a secure connection.</li> <li>2. Clean the filter as instructed in Section 6, "Daily Maintenance."</li> <li>3. Contact Customer Support for further information.</li> </ol>
23	Pump-out not complete after 2 attempts of 6 minutes each	Refer to Error #22.	Refer to Error #22.
31	Oven thermistor malfunction (Connector #9)	Connector is not connected; the connector pin has come off; or the thermistor wire is disconnected.	Contact Customer Support for further information.
32	Rotary valve thermistor malfunction (Connector #11)	Refer to Error #31.	Refer to Error #31.
33	Retort thermistor malfunction (Connector #10)	Refer to Error #31.	Refer to Error #31.

ERROR CODE	DESCRIPTION	POSSIBLE CAUSE	REMEDY
34	Oven temperature too high	The thermistor circuit has been tripped.	Contact Customer Support for further information.
35	Oven temperature too low	Refer to Error #34.	Refer to Error #34.
36	Rotary valve temperature too high	Refer to Error #34.	Refer to Error #34.
37	Rotary valve temperature too low	Refer to Error #34.	Refer to Error #34.
38	Retort temperature too high	Refer to Error #34.	Refer to Error #34.
39	Retort temperature too low	Refer to Error #34.	Refer to Error #34.
40 to 88	Instrument malfunction	1. A strong external source of light is interfering with the photo interrupter in the instrument.  2. Instrument malfunction.	1. Turn the instrument OFF or move it away from any source of very bright light that shines into the rear of the instrument. (Overhead lights will generally not affect the instrument.)  2. If Step #1 does not correct the occurrence of the error, contact Customer Support.



# MINOR REPAIR

## Section 8

### General Information

This section is provided as an aid for performing minor repairs on the Tissue-Tek® VIP™ 5 instrument. The only procedure that can be performed without direct interaction with a Customer Support Representative is the replacement of the retort gasket. For any repairs other than the one given in this section, refer to Section 9, SERVICE AND REPLACEMENT PARTS, for instructions on service for your instrument.

### Replacement of Retort Gasket

If the retort gasket is worn or cracked, the instrument will be unable to maintain pressure or vacuum in the retort. The gasket can be replaced by the following procedure.

#### Tools Required:

None

#### Parts Required:

Retort Gasket (Part No. 1520)

#### Procedure:

1. Remove the old gasket from the groove around the underside of the retort lid.
2. Thoroughly clean the groove using a cloth moistened with alcohol or xylene. Be sure all debris and moisture are removed. Then check the groove carefully for any flaw or irregularity. If any exists, do not operate the instrument; contact Customer Support immediately.

3. Replace the new gasket into the groove ①. The wider side of the gasket ② goes into the groove, with the narrower side ③ facing out (see Figure 8-1).

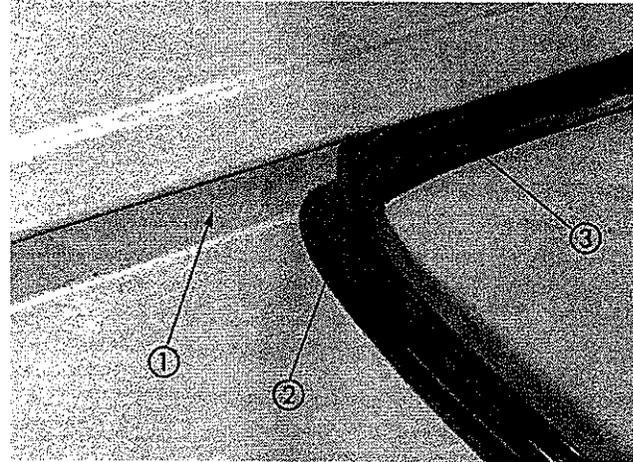


Figure 8-1

Once a small portion of the gasket is fitted into the groove, slowly run your thumb along the gasket, pressing it into the groove all the way around the lid (Figure 8-2). Check carefully to ensure that the entire length is fully inserted inside the groove, with no edges sticking out. If excess remains, apply pressure along the gasket in the opposite direction of insertion to take up any slack.

**CAUTION:** Do not tear or break the gasket with fingernails or sharp objects.

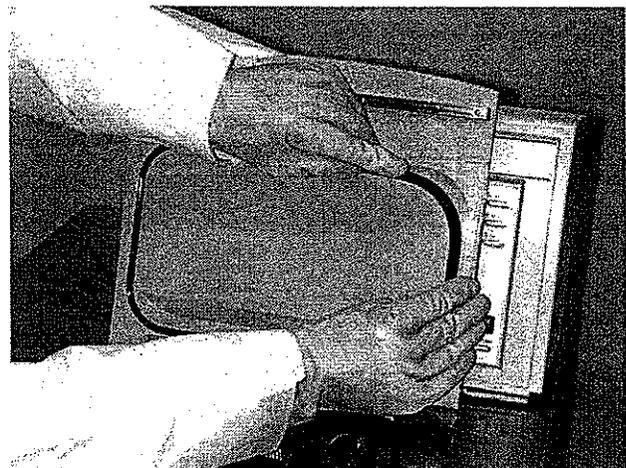


Figure 8-2



# SERVICE AND REPLACEMENT PARTS

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## Service Information

### When You Have a Problem With the Instrument

When problems arise during operation of the Tissue-Tek® VIP™ 5 Vacuum Infiltration Processor, 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, our Customer Support Department is available to assist you.

Before calling for instrument service, collect the information requested in the "Preservice Checklist" in this section. This information will help the Customer Support Representative to identify the probable cause of your instrument malfunction.

The instrument should be disinfected prior to being serviced. If the pump is functioning, performing a Clean Cycle will provide sufficient disinfection. If it is not functioning, the retort should be disinfected as described in Section 6, CARE OF THE INSTRUMENT.

### Where to Call for Service

**If located within the United States**, contact the Customer Support Department of Sakura Finetek U.S.A., Inc. by calling toll free:

**1-800-725-8723**

**In countries other than the United States**, contact the nearest authorized Tissue-Tek instrument distributor or representative for service information and assistance.

# SERVICE/REPLACEMENT PARTS

## Tissue-Tek VIP™ 5 Preservice Checklist

For reference, record the following information:

Model / Serial Number: \_\_\_\_\_ Installation Date: \_\_\_\_\_

1. Has Section 7, Troubleshooting, been reviewed?  YES  NO
2. When the power is turned ON, does the screen show an appropriate display?  YES  NO
  - If NO, is the unit plugged into a live AC electrical outlet?  YES  NO
3. Are all reagent bottles securely connected to the quick-release connectors?  YES  NO
4. Are all reagent bottles filled to their proper levels?  YES  NO
5. Are any warnings being displayed?  YES  NO
  - If so, have they all been corrected and cleared?  YES  NO
  - If you are unable to clear a warning, what does it say?  
\_\_\_\_\_
6. Are any errors listed in the "Error Information" screen?  YES  NO
  - If so, please list the information from that screen:
7. Do the oven and retort temperatures regulate properly?  YES  NO  
Oven Temperature: \_\_\_\_\_ °C Retort Temperature: \_\_\_\_\_ °C
8. Which station number is being highlighted? \_\_\_\_\_
9. Is an "Operation" being displayed?  YES  NO
  - If YES, which?  
Pump In  Pump Out  Move Station
10. Does the "Retort" display show an operation?  YES  NO
  - If YES, which?  
Vacuum  Ambient  Pressure
11. Is there fluid in the retort?  YES  NO
  - If YES, how much? **CAUTION: Do NOT attempt to open the retort if the display shows either "Vacuum" or "Pressure."** \_\_\_\_\_
12. Does the pump operate?  YES  NO
13. What is the level of vacuum and/or pressure?  
Pressure: \_\_\_\_\_ kg/cm<sup>2</sup> Vacuum: \_\_\_\_\_ cm Hg
14. Are the time and date being displayed accurately?  YES  NO

Error	Sta.	Retort Temp.	Oven Temp.	Rotary Valve Temp.	Time
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

## Replacement Accessory Items

Product No.	Description
4899	Tissue-Tek® VIP™ Activated Carbon (2 Cartridges)

## Replacement Parts

Product No.	Description
1520	Retort Gasket
1550	Paraffin Scraper
5264	Basket Transport Tray
5265	150-Cassette Basket with Dividers and Handles
5266	65-Cassette Basket with Dividers and Handles
5267	150-Cassette Basket with Dividers
5268	75-Cassette Basket with Dividers
5269	Basket Hook for Product No. 5267
5270	Basket Hook for Product No. 5268
5271	Individual Basket Dividers (6/pkg)
5272	Reagent Bottle
5273	Reagent Bottle Labels (1set)
5274	Paraffin Container
5275	Displacement Blocks (3/Pkg)
5276	Drain/Fill Hose
B4-00-0230	Overflow Bottle
999-489-08	Service Manual
0001193-01	Operating Manual

### Where to Order:

In the United States, the above Replacement Accessory Items and Replacement Parts may be ordered directly from:

**CUSTOMER SERVICE**  
**Sakura Finetek USA, Inc.**  
**1750 West 214th Street**  
**Torrance, CA 90501**

or by calling toll free:  
**1-800-725-8723**

**Outside of the United States,** contact the nearest authorized Tissue-Tek instrument distributor.



# EXAMPLE

# PROCESSING

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## Sample Programs

Following are two examples of programs, one for a routine overnight run and the other for a rush or biopsy run. Example reagents and concentrations are shown also. The programs are intended to be used as a guide only; modify them to satisfy the individual needs of your laboratory. Following the example programs are several pages on which you can write your own individual programs.

**EXAMPLE PROCESSING PROGRAMS (To be used as a guide only)**

**Routine Overnight Run**

Station No.	Solution	Code No.	Conc.	Time (hr:min)	Set Temp.	P/V	Mix
1	Neutral Buffered Formalin	05	10%	2:00	40°	On	Slow
2	Neutral Buffered Formalin	05	10%	2:00	40°	On	Slow
3	Ethanol	12	65%	0:30	40°	On	Slow
4	Ethanol	12	80%	0:30	40°	On	Slow
5	Ethanol	12	95%	0:45	40°	On	Slow
6	Ethanol	12	95%	0:45	40°	On	Slow
7	Ethanol	12	100%	0:45	40°	On	Slow
8	Ethanol	12	100%	0:45	40°	On	Slow
9	Xylene	20	100%	0:45	40°	On	Slow
10	Xylene	20	100%	0:45	40°	On	Slow
11	VIP Paraffin	30		0:30	58°	On	Slow
12	VIP Paraffin	30		0:30	58°	On	Slow
13	VIP Paraffin	30		0:30	58°	On	Slow
14	VIP Paraffin	30		0:30	58°	On	Slow

Total Processing Time: 12.7 hours

**Rush or Biopsy Run**

Station No.	Solution	Code No.	Conc.	Time (hr:min)	Set Temp.	P/V	Mix
1	Neutral Buffered Formalin	05	10%	0:30	40°	On	Cont
2	Neutral Buffered Formalin	05	10%	0:30	40°	On	Cont
3	Ethanol	12	65%	0:10	40°	On	Cont
4	Ethanol	12	80%	0:10	40°	On	Cont
5	Ethanol	12	95%	0:10	40°	On	Cont
6	Ethanol	12	95%	0:15	40°	On	Cont
7	Ethanol	12	100%	0:15	40°	On	Cont
8	Ethanol	12	100%	0:15	40°	On	Cont
9	Xylene	20	100%	0:15	—	On	Cont
10	Xylene	20	100%	0:15	—	On	Cont
11	VIP Paraffin	30		0:15	58°	On	Cont
12	VIP Paraffin	30		0:15	58°	On	Cont
13	VIP Paraffin	30		0:15	58°	On	Cont
14	VIP Paraffin	30		0:15	58°	On	Cont

Total Processing Time: 5 hours