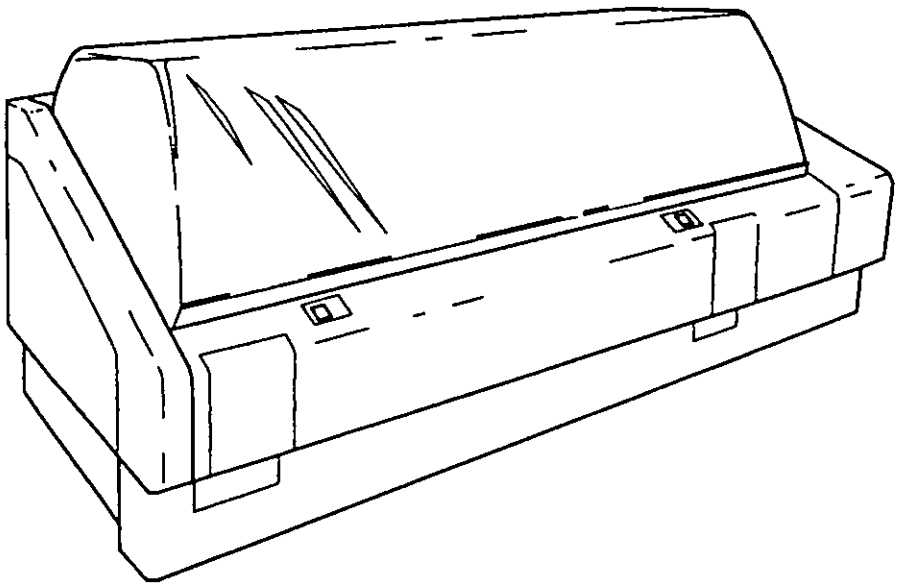
LEICA AUTOSTAINER XL

Automated Slide Stainer



Instruction Manual

LEICA AutoStainer XL V1.10 - July 1993

Always keep this manual together with the instrument

Before working with the instrument read this instruction manual carefully!

Leica

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MANUFACTURED IN AUSTRALIA
SERIAL NO:XL 066795
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Produced by
Australian Biomedical Corporation
for
Leica Instruments GmbH

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WARNING: PLEASE READ THIS MANUAL CAREFULLY BEFORE USING THE AutoStainer XL.

Note: The manufacturer reserves the right to alter the AutoStainer XL specification without notice.

Hazardous reagents

Some reagents of a hazardous nature are employed for histochemistry. Laboratory staff and service personnel are advised to familiarise themselves with these hazards, prior to using or servicing the AutoStainer XL.

Servicing

AutoStainer XL contains no user-serviceable components. Contact your service agent for all servicing. Any device that is serviced, using other than the authorised procedures or the components listed in the Spare parts/module list contained in the Service Manual, will not be covered under the warranty and liability offered by The manufacturer.

Chapter 1 - Introduction

Staining Excellence Through Innovation

The AutoStainer XL is the result of an extensive research program to provide an innovative stainer which meets the quality requirements of the modern laboratory, as well as:

- High throughput
- Flexibility
- Safety

The AutoStainer XL achieves its high throughput by means of an innovative slide-rack transfer mechanism which allows continuous loading of up to 11 racks of 30 slides each.

The flexibility of AutoStainer XL also permits simultaneous processing of slide racks according to different staining protocols so that Papanicoleau and Haematoxylin/Eosin staining can be conveniently performed at the same time, without reprogramming or reagent changes.

The AutoStainer XL incorporates all of the features which ensure high flexibility, convenience and above all, quality staining. A fan forced oven is available to quickly dry slides and optimised wash stations result in rapid removal of excess reagent. The minimum carryover design of the slide racks ensures that there are no drips and reagent life is extended.

The AutoStainer XL is safe to use and has an integral fume control system. Rack loading and unloading is achieved by a unique two drawer system which means virtually no exposure to fumes.

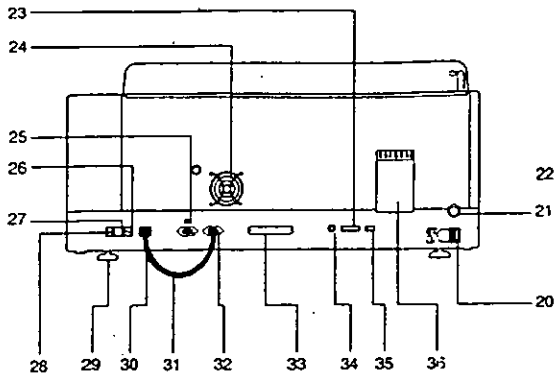
The outstanding flexibility, throughput and quality staining capability of AutoStainer XL has set a new standard in staining excellence.

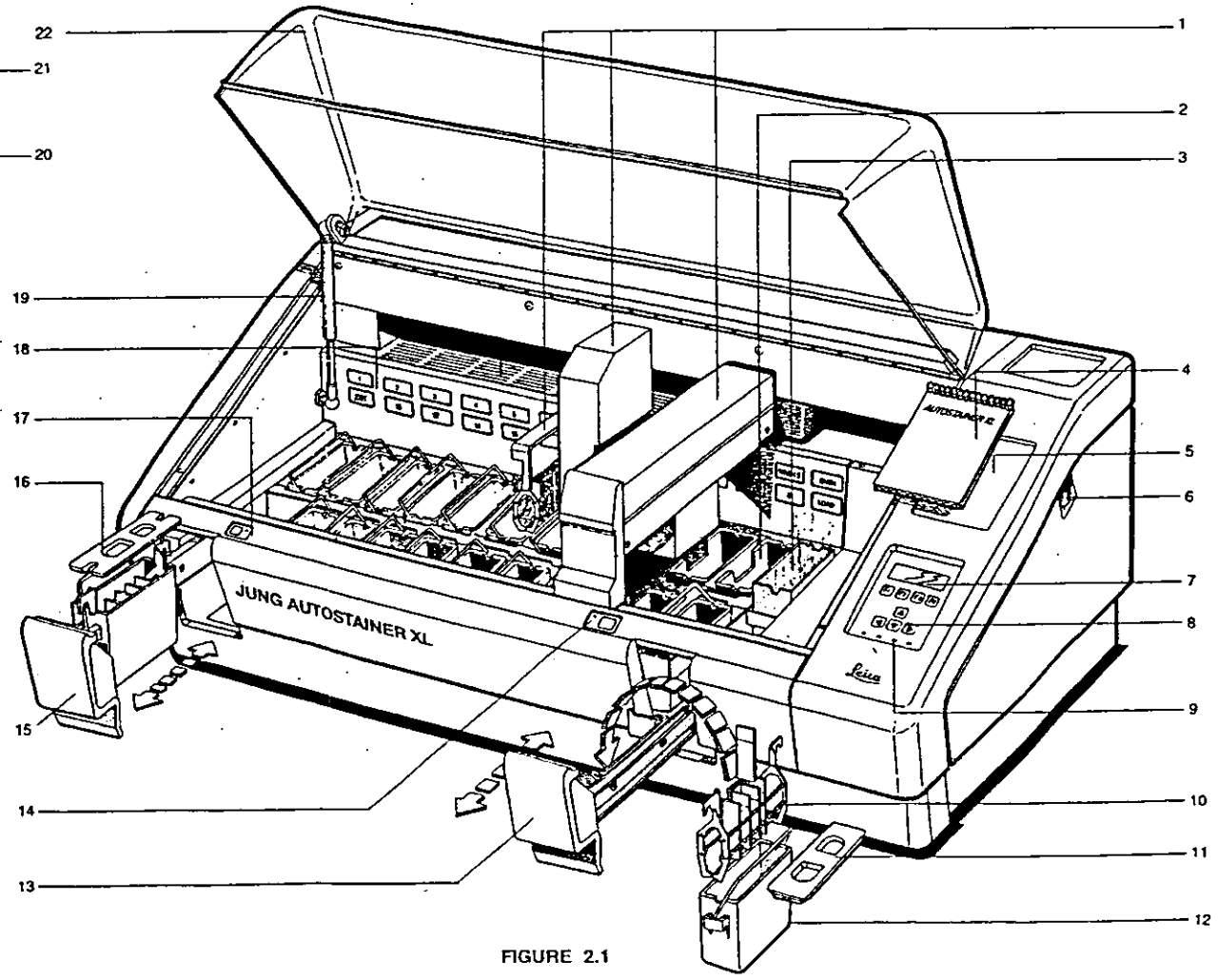
Chapter 2 - Installing AutoStainer XL

Introduction

Instructions on how to install the instrument are provided in this chapter. A diagram and description of components is also given. Finally, the procedure for replacement of the fume filter is outlined.

Components





1. Transfer mechanism
2. Wash stations
3. Oven
4. Program pad
5. Program pad recess
6. ON/STOP switch
7. Display screen
8. Keypad
9. LED indicators
10. Slide rack
11. Lid
12. Reagent container
13. Load drawer
14. Load LED and key
15. Exit drawer
16. Slotted lid
17. Exit LED and key
18. Container map on fume filter cover
19. Lid support
20. Drain outlet (reversible)
21. Water inlet
22. Lid
23. Serial port
24. Power supply
25. Power supply voltage selector
26. Oven voltage selector
27. Mains switch (ON/OFF)
28. Mains outlet
29. Feet adjustable
30. Power outlet
31. Power jumper cable
32. Power supply inlet
33. Rating and serial number plate
34. Remote alarm socket, 50V 1A max
35. Accessory port
36. Exhaust air duct

FIGURE 2.1

Site requirements and installation

Site requirements

The AutoStainer XL requires a solid bench of dimensions 1,090mm long and 670mm deep. The instrument must be located within 3 metres of a tap and drain.

The power requirements for the AutoStainer XL are:

8 amps: at 110 volts
4 amps: at 240 volts

The tap selector and other internal components are set by the manufacturer to suit the country of sale.

WARNING: The tap selector setting must not be altered by the user

The AutoStainer XL requires connection to a laboratory water tap with a mains pressure fitting.

Connection

Power

There are two power modules at the rear of the unit:

- The heater control unit (mains input)
- The power supply (to the unit)

Refer to Figure 2.1, Page 2-2.

Connect the power jumper lead between the power outlet on the heater control unit and the power inlet on the power supply. Connect mains power to the heater control unit with the IEC power cable.

WARNING 1: The instrument **must never** be operated without the power jumper cable.

WARNING 2: The instrument **must** be connected to an earthed mains power outlet socket.

How to switch on:

1. Switch power ON at mains wall socket.
2. Set the ON/STOP switch at the side of the unit to STOP.
3. Set the ON/OFF switch at the rear of the unit to ON.
4. Set the ON/STOP switch to ON.

The instrument will then sound 3 short beeps and the **Main Menu** will be displayed.

When the instrument is not in use set the ON/STOP switch at the side to STOP.

The ON/OFF switch at the rear of the instrument should be left ON.

Water supply

Connect the water hose to the water inlet at the rear of the unit. Screw the other end of the hose to the cold water tap. The hose has a 3/4 inch BSP fitting. Slowly turn the tap on fully.

WARNING: Ensure that the water filter is present when fitting the water inlet hose. Failure to do so may result in leakage of water.

Drain hose

Connect the drain hose to the drain outlet on the rear of the unit. The drain outlet fitting may be rotated to point in the required direction by loosening the screw clamp, rotating the fitting and then securing the clamp again. The drain hose is an interference fit on the elbow fitting so that water does not leak at this joint.

One end of the drain hose is supplied with an extra elbow already fitted. This elbow may be removed and the expanded drain hose easily fitted to the instrument. Ensure that the hose is horizontal and place the end into a sink below the level of the bottom of the stainer. Ensure there are no dips in the hose. Shorten the hose and secure if necessary.

Extra elbows may be fitted for a tight bend in the hose or at the exit end of the hose to hook into the sink. Immerse the end of the hose in hot water to facilitate the insertion of the elbow fitting.

Battery Backup (optional)

An uninterruptible power supply (UPS) can be used to permit staining of slides to continue during brief mains power failures. A small UPS can be connected using the power jumper lead, as shown in Figure 2.2.

The UPS should be rated at 200VA for 5 minutes. Heating in the oven will not be maintained by the UPS.

The UPS must be rated for use with the local mains voltages. Your distributor can recommend a suitable UPS.

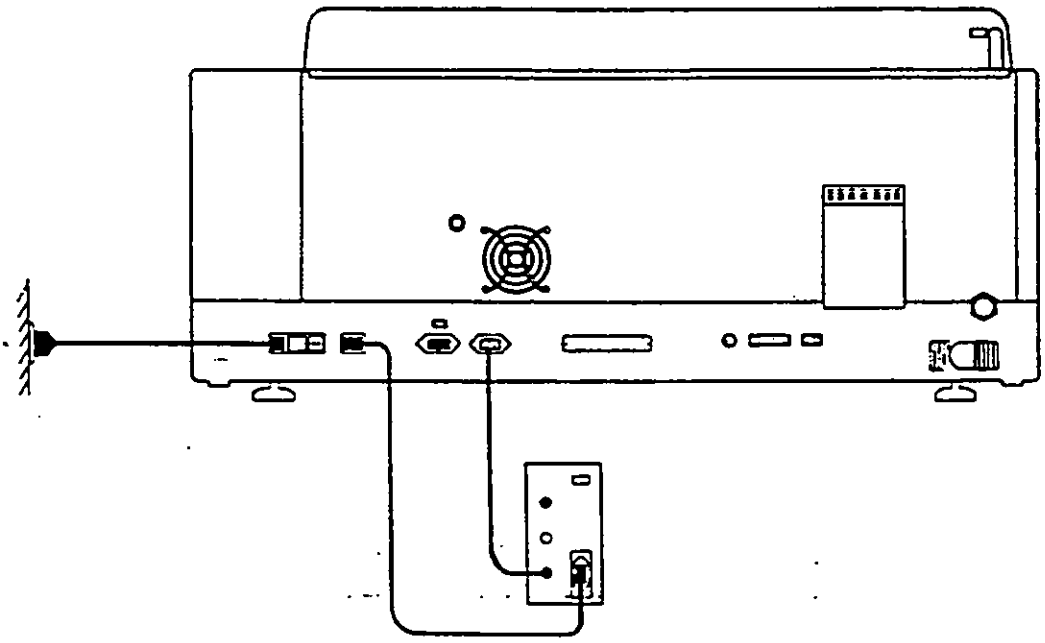


FIGURE 2.2

Remote alarm (optional)

The remote alarm option is a latched relay that is voltage-isolated from the rest of the instrument. When an alarm condition occurs (either a major failure of the instrument, or loss of mains power during a processing run whilst a battery backup unit is fitted) the alarm circuit closes, sounding the alarm.

Note: A battery-powered remote alarm must be used if you require the remote alarm to sound when the mains power fails.

Ensure that the instrument is turned ON and press any key to reset the alarm. If mains power failed during a run, it may be necessary to put the ON/STOP switch at the side of the instrument to STOP, and then to ON again.

The remote alarm will only operate during loss of mains power if a battery backup unit is fitted. Your distributor can provide connection details for the remote alarm.

The remote alarm connected to the instrument must be rated at less than 1 amp and a maximum of 50 Volts.

Connect the remote alarm to the alarm socket at the rear of the unit, using a 6.25mm phono jack.

Fume control system

Fumes are exhausted through the activated carbon filter which must be changed every three months (with average usage).

To remove a filter, lift out the plate covering the filter. Refer to Figure 2.1. Remove the filter, using the tabs. Replace with a new filter and fit the cover into place.

Oven

Fit the wax tray into the bottom of the oven.

Chapter 3 - Using AutoStainer XL

Introduction

This chapter describes how to operate AutoStainer XL. It includes sections on how to use the control panel functions and other indicators, how to create and edit programs and how to stain slides.

AutoStainer XL offers some unique features not available in other stainers and these are explained in subsequent sections. Firstly, slide racks are loaded and unloaded by means of drawers, not by opening the lid. If the instrument is free to accept a rack for staining the Load LED will be on. After loading, the Load key must be pressed to inform the instrument to begin processing. Similarly, if a rack is finished staining in the Exit drawer the Exit LED will be on. The Exit key must be pressed to inform the instrument when the rack is removed. Programs can finish at any station. However, if the EXIT drawer is not the last step then the LCD will inform you of the station to unload from. In this case, the lid will have to be opened to remove the rack.

AutoStainer XL can accept racks whenever the Load LED is on and process up to 11 racks simultaneously.

Each rack can be processed according to any of the 15 programs, provided that the reagents are available and the program chosen is compatible (no conflicting sequence) with programs already being used.

Communication

Communication with AutoStainer XL is via the control panel, load and unload keys and associated indicators and audible signals.

The control panel

The control panel consists of a LCD display, the keypad and four LEDs.

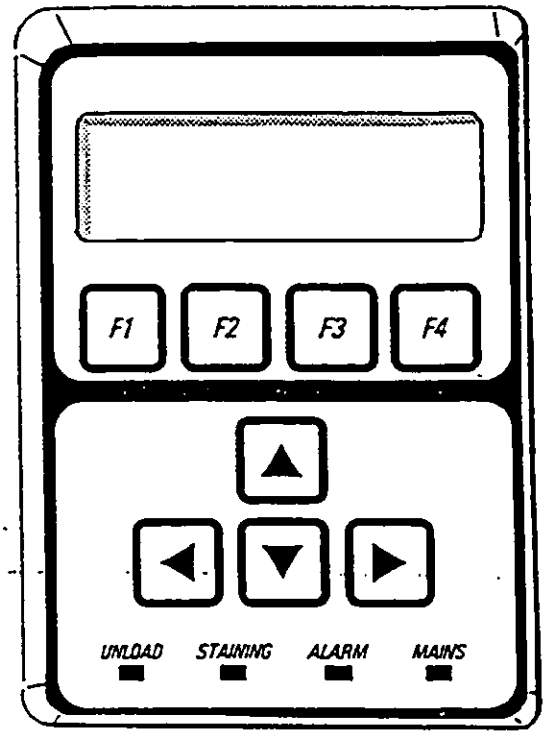


FIGURE 3.1

The display

The display is a four-line LCD with backlighting. The fourth line is usually reserved for commands associated with the function keys [F1] to [F4]. A flashing cursor appears beneath user-changeable settings.

The keypad

The membrane keypad incorporates 4 function keys and 4 arrow keys. The function keys perform the action indicated immediately above them on the fourth line of the display. The arrow keys move the cursor in the direction indicated. They are also used to select digits and other settings.

Note: Contact with solvents, use of sharp instruments or excessive force may damage the keypad.

The LED indicators

The four LEDs are located below the arrow keys and have the following functions. The unload LED (yellow flashing) indicates that a rack has been completed and is ready to be removed from a station other than the exit drawer. The staining LED (yellow) is lit when staining is in progress. The alarm LED (red) indicates that an instrument error has occurred. The mains LED (green) signals that mains power is available (ON at ON/OFF switch, ON at ON/STOP switch).

Load and exit keys and indicators

The load and exit keys and associated LED indicators are located adjacent to the load and exit drawers. For further information, see Pages 3-20 and 3-21.

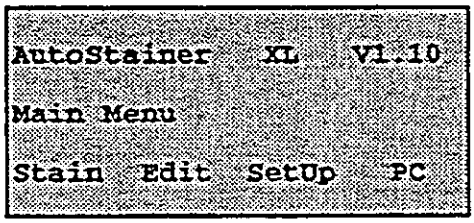
Audible signals

There are four types of audible signals given:

- single beep: indicates key press
- single tone: indicates unacceptable key press or error message
- 2 single tones: operator attention required to remove a completed rack
- continuous tone: indicates unit failure

The Main Menu

When the AutoStainer XL is turned ON at the ON/STOP switch, the following Main Menu will be displayed and the instrument will give 3 beeps.



The modes of operation of the instrument are:

- Stain: to stain slides
- Edit: to create, view or change programs
- SetUp: to set, view or alter parameters such as oven temperature and the number of dips (amount of agitation) upon entering a reagent station
- PC: for service use only

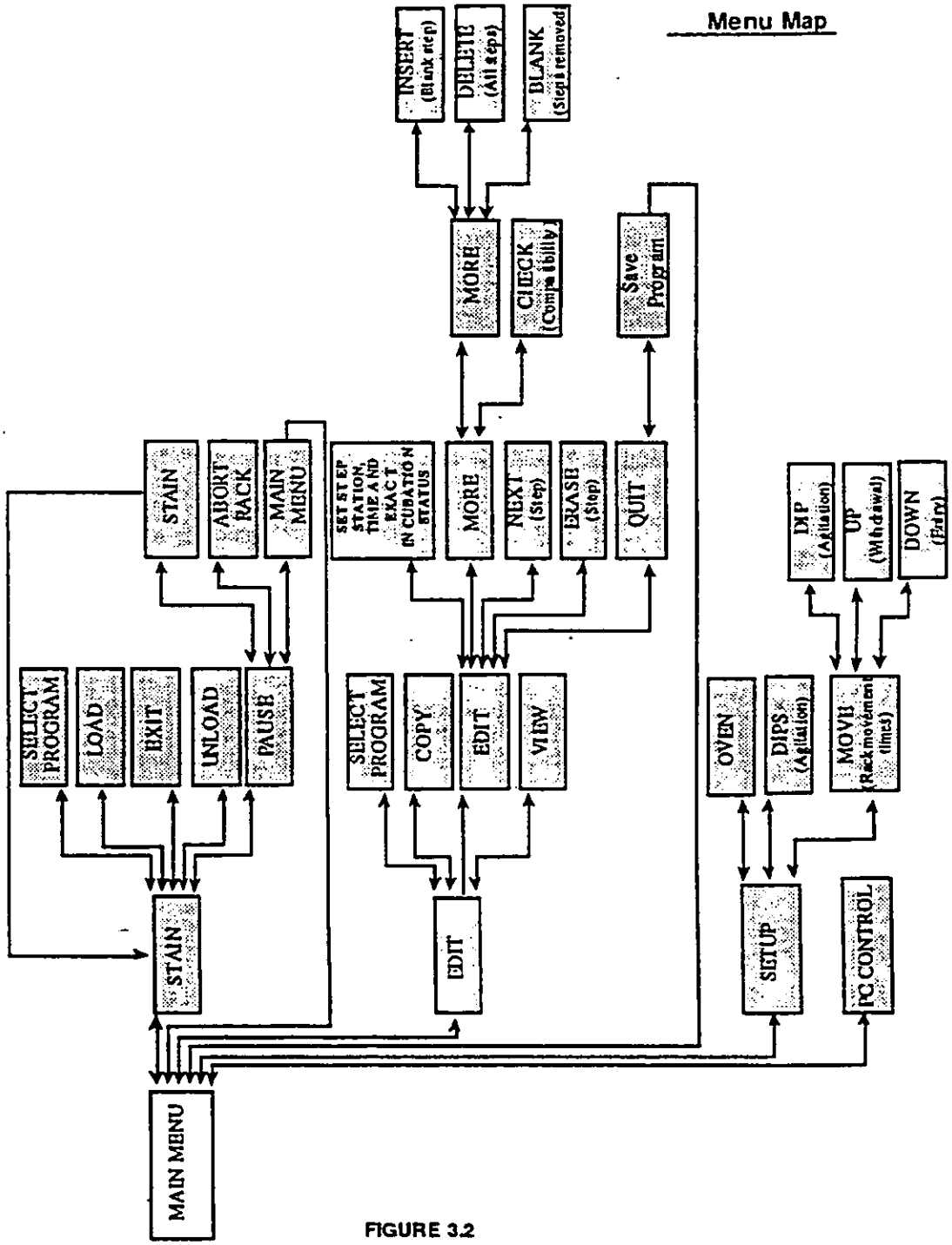

Menu Map
INSERT (Blank step)
DELETE (All steps)
BLANK (Steps removed)
MORE
CHECK (Compatibility)
Save Program
STAIN
ABORT RACK
MAIN MENU
SET STEP STATION, TIME AND EXACT INCUBATION STATUS
MORE
NEXT (Step)
ERASE (Step)
QUIT
DIP (Agitation)
UP (Withdrawal)
DOWN (Entry)
SELECT PROGRAM
LOAD
EXIT
UNLOAD
PAUSE
SELECT PROGRAM
COPY
EDIT
VIEW
OVEN
DIPS (Agitation)
MOVES (Rack movement times)
STAIN
EDIT
SETUP
PC CONTROL
MAIN MENU

FIGURE 3.2

Editing a program

AutoStainer XL can store 15 programs numbered from 1 to 15 in permanent memory. Programming is performed using a simple, menu-driven system and all information is entered via the keypad.

A program consists of 25 steps, some of which may be blank. A step consists of the following information.

- the step number
- the station
- the immersion time
- whether the immersion time must be achieved exactly or not

The step number defines the order in which the stations are used. The immersion time is the time the rack is fully immersed in a station.

As there is potential for timing clashes to occur when multiple racks are present in the instrument, steps which require precise timing are designated as 'exact' in the program. Immersion times at these steps are given priority and are achieved to within ± 1 second. Racks at steps not marked as 'exact' will receive attention as the head becomes available.

> Note: Programs which are assigned to racks currently being stained cannot be altered or copied to.

For an overview of the programming structure, refer to the menu map on Page 3-6.

Entering steps

1. Press [F2] *Edit* from the **Main Menu.**

2. Select the desired program number using the ↑ and ↓ keys.

3. Press [F2] *Edit*

   The first step of the program is then displayed under the following headings:

   - step: the step number
   - stn: the station number or description
   - time: the immersion time, in minutes and seconds
   - exact: whether the immersion time is critical or not

4. With the cursor under the step number, use the ↑ and ↓ keys to move between steps 1 to 25 of the program. Alternatively, press [F2] *Next* to move to the next step.

5. To enter program information, use the ← and → keys to position the cursor beneath the appropriate heading. Scroll through the options or alter the digits using the ↑ and ↓ keys. Fill in the program details, using the ← and → keys to move to the next heading as each item in the step is completed.

Note: An immersion time of 00:00 means that this step will be omitted.

6. Repeat steps 4 and 5 until the program is complete.

Note: If you wish the rack to finish in the EXIT drawer, insert this as the last step.

7. To save the program, see Page 3-12.

Erasing steps

Information contained in a step may be erased leaving a blank step.

1. To select the program, see Steps 1 to 3, Page 3-8
2. To select the step to be deleted, see Step 4, Page 3-8
3. Press **[F3]** *Erase*.

   The step will be left blank.

   You may enter new step details, if desired.
4. To save the program, see Page 3-12.

Inserting a blank step into a program

This function is used to insert an additional step into an existing program.

1. Select the program (see Steps 1 and 2, Page 3-8).
2. Press [F2] *Edit.*
3. Select the step number where the new (blank) step is to be inserted.
4. Press [F1] *More*
5. Press [F1] *More*
6. Press [F1] *Insert*
7. If you wish to proceed, press [F1] *Yes.*

   A blank step will be inserted at the step selected in (3.)

Note: The steps following the blank step will be re-numbered. Step 25 is lost when a blank step is inserted.

8. Continue to edit the program as required.
9. To save the program, see Page 3-12.

Removing blank steps in a program

This function is used to remove blank steps where a program has been edited by deleting one or more steps. Steps will be sequentially renumbered in the same sequence as the original program.

1. Select the program (see Steps 1 and 2, Page 3-8).
2. Press [F2] *Edit*.
3. Press [F1] *More*.
4. Press [F1] *More*.
5. Press [F3] *Blank*.
6. If you wish to proceed, press [F1] *Yes*. The blank steps will be removed and subsequent steps will be renumbered.
7. To save the program, see page 3-12.

Saving a program

When the program is complete, to save it permanently:

1. From the **Edit Program** screen, press [F4] *Quit*. You now have the options of saving the edited program [F1], leaving the program as it was before the changes were made [F2], or continuing editing [F4].
2. Press [F1] to save the program, or
3. Press [F2] to leave the program unchanged, or
4. Press [F4] to continue editing the program.

Deleting a program

This function is used to delete all steps in a program.

1. Select the program (see Steps 1 and 2, Pages 3-8).
2. Press [F2] *Edit*.
3. Press [F1] *More*.
4. Press [F1] *More*.
5. Press [F2] *Delete*.
6. If you wish to proceed, press [F1] *Yes*.
7. To save the program (which now contains no steps), see above.

Copying a program

This function is used to copy a program into another program number.

1. Select the program to be copied (see Steps 1 and 2, Page 3-8).
2. Press [F1] *Copy*.

Note: If an empty program has been selected, an informative message will be given.

3. Using the ↑ and ↓ keys, select the program number to be copied into.
4. Press [F1] *Copy*.

Note 1: If the program number selected is not empty, an informative message will be given.
Note 2: If the program selected is assigned to a rack currently being stained, the copy is not allowed and an informative message will be given.

A confirmatory message will be momentarily displayed if the copy is successful.

5. If you wish to copy the program to another program number, repeat Steps 3 and 4.
6. Press [F4] *Cancel* to exit from copying.

Viewing a program

To view a program:

1. Select the program using Steps 1 and 2, Page 3-8.
2. Press [F3] *View*.

   Up to four steps can be viewed simultaneously. Use the ↑ and ↓ keys to view other steps.
3. Press [F4] to return to the previous screen.

Checking program compatibility

This function is used to check whether two programs can be run simultaneously. Programs cannot be run together if they contain the same two stations but in reverse order, as in the following two programs:

Program 1	**Program 2**
Station 1	Station 1
Station 2	Station 3
Station 3	Station 2

1. Select the program (see Steps 1 and 2, Page 3-8).
2. Press [F2] *Edit*.
3. Press [F1] *More*.
4. Press [F2] *Check*.
5. Using the ↑ and ↓ keys, select the program number that you wish to check compatibility with.

6. Press [F2] *Check.*

   A message will inform you whether the programs are compatible.

7. If the programs are not compatible, an explanation will be given. Press [F4] to continue.

8. Repeat Steps 5 and 6 to check compatibility with other programs.

9. Press [F4] to return to the program selected at Step 1.

Note: Many of the program incompatibility situations arise from allocation of water wash stations. These stations are now user-selectable with Version 1.10 software.

Appendix 3 gives some examples of common staining protocols which are compatible.

General instrument set up parameters

There are several user adjustable parameters on the AutoStainer XL which apply to the instrument's operation independently of the program selected. These are:

- oven temperature
- amount of agitation on entry to a station, specified as the number of dips.
- agitation time, specified as the time taken for a complete agitation cycle, ie up and down.
- rack withdrawal time, specified as the time taken for the rack to be withdrawn from a station.
- rack entry time, specified as the time taken for the rack to be lowered into a station.

Oven

You can set the temperature of the oven in the range 30-65°C, or select heating to be OFF.

Note:	1. The oven will operate at the setting selected during the entire staining process, whether or not it is being used. 2. The selected temperature will be displayed during staining.

To set, view or change the oven setting:

1. Press [F3] *SetUp* from the **Main Menu.**

   The current oven setting is then displayed on the first line.

   To alter the setting:

2. Press [F1] *Oven.*

3. Press [F1] to turn the oven on, or

   Press [F2] to turn the oven off, or

   Use the [↑] and [↓] keys to alter the oven temperature.

4. Press [F4] to return to the **SetUp** screen.

   The new oven setting will now be displayed.

5. Press [F4] to return to the **Main Menu.**

Agitation (Dips)

You can set the number of times the slide rack is moved up and down (dips) on entry to a reagent station, in the range OFF/1-20/continuous.

Note: If continuous is selected, only one slide rack will be processed in the instrument at any one time.

To view or change the setting:

1. Press [F3] *SetUp* from the **Main Menu.**
   The current setting will be displayed on the second line.

To alter the setting:

2. Press [F2] *Dips.*

3. Press [F1] to turn the dips on, or
   Press [F2] to turn the dips off, or
   Use the ↑ and ↓ keys to alter the number of dips.

4. Press [F4] to return to the **SetUp** screen.
   The new Dips setting will now be displayed.

5. Press [F4] to return to the **Main Menu.**

Note: The time for a single Dip (down and up) is selected in Rack movement times. Use this as a guide when setting the number of dips. If the immersion time is shorter than the time to do the set number of dips, only the number of dips that fit into the immersion time will be done.

Rack movement times

You can set the rack agitation, withdrawal and entry times to suit your run time and agitation requirements. Refer to Appendix 1 for the allowable ranges.

To view or change the settings:

1. Press [F3] *SetUp* from the **Main Menu.**

2. Press [F3] *Move.*
   The current settings are displayed shown as the seconds taken for each movement, ie. agitation cycle time (Dip), rack withdrawal time (Up) and rack entry time (Down).

3. To change any of the values, press [F1] *Dip,* [F2] *Up* or [F3] *Down* to position the cursor beneath the appropriate value.

4. Use the ↑ and ↓ keys to alter the setting.

5. Repeat steps 3 and 4 as required.

6. Press [F4] *Return* to return to the **SetUp** screen.

7. Press [F4] *Return* to return to the **Main Menu.**

Staining

This section provides a guide to staining slides.

The AutoStainer XL can accept slide racks whenever the load station is empty and stain them according to the program selected for each rack. Different programs may be used simultaneously provided they are compatible. To check whether programs are compatible, refer to Page 3-14.

Reagent containers

Reagent containers can be individually removed for filling. For use, fill the reagent containers to the line marked on the inside (450ml capacity) and place into position in the instrument consistent with the programs you wish to run.

There is an area for a label on the end of the containers just above the handle pivots.

The container map inside the instrument (see Figure 2.1) defines the station numbers. Ensure that the reagent containers are correctly seated and that the handles are over to the side and will not obstruct slide rack movement. Lids are provided to reduce evaporation while the reagent containers are not in use.

- The Load and Exit drawer containers can be filled with a reagent if desired. However, the instrument will not control the immersion time in these stations.

Wash system

The wash system consists of five wash stations each capable of holding one slide rack. Water enters the wash station from the base and exits from the overflow lip at the top left hand edge.

Note 1: Wash stations have a locating pin and can only be inserted one way.

Note 2: Take care when fitting or removing wash stations as the seals may be damaged by excessive force. Wet the 'O' ring seal before fitting a wash station.

To use the wash system, slowly turn the laboratory tap on fully. The flow control valve in the AutoStainer XL will limit the total water flow in the wash stations to 8 litres/minute.

Note: If the water flow drops below this level for any reason the wash period specified in the program may have to be extended.

Water saving

The AutoStainer XL is fitted with a water-saving feature which stops the flow of water when none of the wash stations is in use and the excess reagent has been flushed from them.

Loading slide racks

Slide racks are inserted into the instrument via the load drawer only, situated at the front right hand side of the instrument. To operate the drawer, grasp and push up with several fingers on the release lever on the underside of the drawer and pull outwards.

To load a slide-rack:

1. Select [F1] *Stain* from the **Main Menu**.

   The instrument will take a few seconds to initialise.

> **Note:** If a rack is already loaded then the **Abort menu** will be displayed. Press [F1] *Stain* to continue.

2. Select the required program number using the ↑ and ↓ keys.

   Check to see that the load drawer is empty (the **[load]** LED will be lit). Open the drawer and insert the slide rack, ensuring that it is correctly seated. Close the drawer.

3. Press the **[Load]** key.

   If the program is compatible with programs in use then the [Load] LED will go off and the rack will be processed according to the chosen program, otherwise an informative message will be given and the rack will not be processed.

4. To load additional slide racks, repeat Steps 2 and 3.

> **Note:** If the instrument is processing a rack, there may be a delay before additional racks begin processing.

Unloading racks from the Exit drawer

When a rack is in the Exit station, the **[Exit]** LED will be on and the beeper will sound every 30 seconds.

To unload a rack from the Exit drawer:

1. Open the exit drawer carefully and remove the rack. Alternatively, remove the entire reagent container from the drawer and replace it with another.

2. Close the drawer and press the **[Exit]** key. *The LED will then go off.*

Note: If the **[Exit]** key is not pressed the instrument will be unable to finish the processing of further racks which require this station.

Unloading racks from other stations

If the final step in a program is not the Exit drawer, the **[Unload]** LED on the control panel will flash when processing is complete.

To unload the rack:

1. Press **[F1]** *Unload.*

   A confirmatory message will be given while the head completes its current operation. The station number of the completed rack will then be displayed.

2. Select the station number of the rack you wish to remove using the [↑] and [↓] keys (if more than one rack is completed), or

3. Press **[F4]** *Cancel* if you do not wish to unload the rack. The instrument will then resume processing.

4. Press [F1] *Unload.*

   Open the lid and remove the rack.

5. Press [F1] *Done.*

6. Repeat Steps 2 to 5 to remove other completed racks.

Interrupting staining

The staining sequence can be interrupted to:

- edit a program not currently being used for staining
- change the general instrument SetUp parameters
- allow access to the instrument to check/change reagents
- abort staining of one or more racks

To interrupt staining:

1. Press [F4] *Pause* to return to the **Abort** screen.

Note: If staining is interrupted, immersion times probably will not be identical to those in the chosen program(s).

Note: If no racks are loaded then the Main Menu will be displayed.

2. To abort a rack, refer to Page 3-23 or

3. Press [F1] *Stain* to continue staining, or

4. Press [F4] *Main Menu* to return to the **Main Menu.**

   You may now edit programs not currently in use or change the instrument SetUp parameters.

   To resume staining, press [F1] from the **Main Menu.**

Aborting a rack

To abort staining of a rack:

1. Press [F4] *Pause* from the **Staining** screen.
2. Press [F2] *Abort rack.*
3. Using the ↑ and ↓ keys, select the station containing the rack you wish to abort.
4. Press [F2] *Abort.*
5. Remove the rack, as instructed. Press [F1] *Done.*
6. To abort other racks, repeat steps 3 to 5.
7. Press [F4] *Cancel* to exit from the **Abort** screen.
8. Press [F1] to continue staining or press [F4] to return to the **Main Menu** as desired.

Cleaning

Cleaning the instrument

Clean interior stainless steel surfaces with detergent and rinse with water. Clean the head covers by wiping with a damp cloth.

WARNING: The head contains sensitive electronic components. Do not use liquids directly on this region. Wipe clean only.

The drain system may be flushed with 5% Sodium Hypochlorite to inhibit microbial growth. If used, ensure that this solution does not remain in contact with any metal parts for prolonged periods and flush well with water after use. Exterior (painted) surfaces can be cleaned with a mild detergent and wiped with a damp cloth.

Note: Avoid the use of solvents on exterior surfaces and especially on the control panel and lid.

Wipe the control panel carefully with a damp cloth.

Wash containers

Remove the wash containers and clean with detergent.

Reagent containers

Wash in warm water with detergent.

Warning: Do not wash reagent or wash containers in an automatic dishwasher.

Slide racks

Clean with detergent or laboratory cleaning agent as required.

Oven

Periodically check the wax tray at the bottom of the oven and clean it if excessive wax dripping has occurred.

Chapter 4 - Errors and Faults

Introduction

AutoStainer XL continually monitors itself and will report any errors as they occur. If a minor error occurs during staining the instrument will attempt to correct the problem first. If it is unsuccessful then a message will be given and the instrument will wait for the user to rectify the problem.

Some faults cause the alarm to sound. The alarm can be turned off by pressing **[F1]** *Quiet.*

[F2] Pause can be used to pause staining from the error message display.

A list of instrument messages and their meanings follows.

Instrument Failures

Mains Power fail	This warning message indicates that mains power has failed. It will only appear if a UPS is fitted. Refer to page 2-6 for further information.
Power Supply fail	The power supply has failed and must be serviced.
Make sure that the head is free of obstruction	The rack transfer arm (head) has stalled during operation. The most likely causes of this are: 1. reagent container not properly seated 2. handle not properly positioned 3. lid left on reagent container, or 4. slide rack bent The instrument will attempt to restart staining once the problem is rectified.
Head stalled	Even after attempting to restart staining the head is still unable to move freely. Remove any obstructions and recommence staining or contact your service agent if the problem persists.
Fume system blocked	The outlet duct at the rear of the instrument is blocked. Remove the blockage.
Oven failure	The oven has failed and must be serviced. The instrument is still operational at all other stations but slide drying must be performed outside the AutoStainer.
Oven overheating	The most likely cause of this message is a blockage in the oven. Check that the slot at the base of the oven is not obstructed.
Remove obstruction and replace rack on hook	The rack might have disengaged from the hook. Rectify the cause of the problem (eg reagent container not properly seated) and replace rack on hook.

Informative messages and warnings

During staining

Program (x) cannot be used for staining	Program (x) is either empty, or consists entirely of blank or zero time steps.
Program (x) is not compatible with programs in use	Program (x) is incompatible with a program assigned to a rack(s) currently being stained. The rack(s) must be completed before program (x) can be used. Refer to Page 3-14.
Ensure a rack is in the Load drawer and close the drawer	The load drawer must be closed before the instrument can pick up the rack.
Ensure the Exit drawer is empty and close the drawer	The Exit drawer must be closed before a rack can be placed into it.

During editing programs

Station (x) and Station (y) are in reverse order	The message occurs during a compatibility check of two programs. The stations specified are in the opposite order in the two programs which cannot be used concurrently.
The steps after Exit will be ignored	Exit occurs before the end of the program and the remainder of the steps will be ignored.
Program (x) is in use for staining and cannot be altered	A program which is currently being used for staining cannot be altered. Copy the program to another program number and then edit it.

During SetUp

SetUp lost. Default SetUp used	Programs and SetUp have been lost and must be entered again.
Battery backed RAM Failure! Service is required	The internal memory must be replaced. Contact your service agent.
Caution: increasing Dips might extend some station times	Increasing the amount of agitation while racks are currently being stained might extend exact immersion times. Selecting continuous agitation will result in only one rack being progressed at a time.

Appendix 1
User-adjustable parameters

Item	Factory setting	Changeable	Range
Slides per rack	N/A	N/A	0-30
Racks in the instrument	N/A	Y	0-11
Stations	18 Reagent	N	0-18
	5 wash		0-5
	1 oven		0-1
	1 load drawer		1
	1 exit drawer		0-1
Programs	15	N	15
Steps per program	25	N	25 (Note: some steps can be blank)
Immersion time	N/A	Y	0 sec-59min 99sec (Note: 0 seconds means the step is omitted)
Timing accuracy (Exact)	N/A	Y	± 1second (Exact) -0,+ infinity(not Exact)
Oven temperature	N/A	Y	Off/30-65°C
Agitation (Dips)	N/A	Y	Off/1-20/ Continuous
Agitation time (Dip) (seconds/cycle)	2	Y	1-4
Rack withdrawal time (Up) (seconds)	9	Y	4-9
Rack entry time(Down) (seconds)	2	Y	2-4

Appendix 2
Consumables and accessories

CONSUMABLES	PART No
Activated carbon filter	1404743 2273 ~~0456 25623~~

ACCESSORIES	PART No
	List
Drain hose	0456 25624
Inlet hose	0456 25625
Reagent container with lid and handle	~~0456 25627~~ $91.00 1404753 3659
Wash container	~~0456 25628~~ 1404563 5268 $137.00
Slide rack	~~0456 25629~~ 1404563 3919 $176.00
Lid for reagent container	0456 25631
Slotted lid for reagent container	0456 25632
Program pad	0456 25633
User Manual	0456 25634
Slide rack holder	0456 25641
Reagent container holder	0456 25642

Appendix 3
Compatible staining programs

In this appendix a few examples of compatible staining programs are shown in detail.

		Program 1 H & E			Program 2 Papanicoleau		
Reagent	Station	Step	Time	Exact	Step	Time	Exact
	Oven	1	10:00	Y		:	
Xylene	1	2	2:00	N		:	
Xylene	2	3	2:00	N		:	
Absolute Alcohol	3	4	2:00	N		:	
Absolute Alcohol	4	5	2:00	N		:	
70% Alcohol	5	6	1:00	N	1	1:30	N
Wash	Wash 1	7	2:00	N	2	2:00	N
Haematoxylin	6	8	5:00	Y	3	3:30	Y
Wash	Wash 2	9	2:00	N	4	2:00	N
Acid Alcohol	7	10	0:02	Y	5	0:05	Y
Wash	Wash 3	11	3:00	N	6	2:00	N
Scott's	8	12	3:00	Y	7	4:00	Y
Wash	Wash 4	13	3:00	N	8	2:00	N
95% Alcohol	9		:		9	1:30	N
OG 6	10		:		10	2:00	Y
95% Alcohol	11		:		11	1:30	N
95% Alcohol	12		:		12	1:30	N
EA 50	13		:		13	2:30	Y
Eosin	14	14	2:00	Y		:	
95% Alcohol	15	15	0:30	Y	14	1:30	Y
Absolute Alcohol	16	16	2:00	N	15	1:30	Y
Absolute Alcohol	17	17	2:00	N	16	1:30	Y
Absolute Alcohol	18	18	2:00	N	17	1:30	Y
Xylene	Exit	19	:		18	:	
			:			:	

Notes 1. Washes 1 to 4 (and the stations between) are used in the same sequence in both programs.

2. These programs are compatible with each other but not with programs 3 & 4 on Page A3-2.

		Program 3 H & E			Program 4 PAS		
Reagent	Station	Step	Time	Exact	Step	Time	Exact
	Oven	1	10:00	Y	1	10:00	Y
Xylene	1	2	2:00	N	2	2:00	N
Xylene	2	3	2:00	N	3	2:00	N
Absolute Alcohol	3	4	2:00	N	4	2:00	N
Absolute Alcohol	4	5	2:00	N	5	2:00	N
70% Alcohol	5	6	1:00	N	6	1:00	N
Dist. Water	6		:		7	1:00	N
Periodic acid	7		:		8	10:00	Y
Wash	Wash 1		:		9	3:00	N
Schiffs	8		:		10	15:00	Y
Wash	Wash 2	7	2:00	N	11	3:00	N
Haematoxylin	9	8	5:00	Y	12	5:00	Y
Wash	Wash 3	9	2:00	N	13	2:00	N
Acid Alcohol	10	10	0:02	Y	14	0:02	Y
Wash	Wash 4	11	3:00	N	15	3:00	N
Scotts	11	12	3:00	Y	16	3:00	Y
Wash	Wash 5	13	3:00	N	17	3:00	N
Eosin	12	14	2:00	Y		:	
95% Alcohol	13	15	0:30	Y	18	0:10	Y
Absolute Alcohol	14	16	2:00	N	19	2:00	N
Absolute Alcohol	15	17	2:00	N	20	2:00	N
Absolute Alcohol	16	18	2:00	N	21	2:00	N
Xylene	17	19	2:00	N	22	2:00	N
Xylene	18	20	2:00	N	23	2:00	N
Xylene	Exit	21	:		24	:	

Notes 1. Either Wash 1 or 2 may be used as the first wash step in Program 3.

2. Washes 3, 4 & 5 occur after Haematoxylin and in the same sequence in both programs.

3. A distilled water rinse is used as the first wash step of Program 4 (which would otherwise require 6 wash steps).

		Program 1 H & E			Program 5 Hx Counterstain		
Reagent	**Station**	**Step**	**Time**	**Exact**	**Step**	**Time**	**Exact**
Oven		1	10:00	Y			
Xylene	1	2	2:00	N			
Xylene	2	3	2:00	N			
Abs. Alcohol	3	4	2:00	N			
Abs. Alcohol	4	5	2:00	N			
70% Alcohol	5	6	1:00	N			
Wash	Wash 1	7	2:00	N			
Haematoxylin	6	8	5:00	Y	1	5:00	Y
Wash	Wash 2	9	2:00	N	2	2:00	N
Acid Alcohol	7	10	0:02	Y	3	0:02	Y
Wash	Wash 3	11	3:00	N	4	3:00	N
Scotts	8	12	3:00	Y	5	3:00	Y
Wash	Wash 4	13	3:00	N	6	3:00	N
Eosin	14	14	2:00	Y			
95% Alcohol	15	15	0:30	Y			
Abs. Alcohol	16	16	2:00	N	7	2:00	N
Abs. Alcohol	17	17	2:00	N	8	2:00	N
Abs. Alcohol	18	28	2:00	N	9	2:00	N
Xylene	Exit	19			10		

Glossary

CARRYOVER	The amount of REAGENT carried from one STATION to another by the SLIDE RACK
CURSOR	Flashing bar on LCD beneath user-changeable data.
DIP/DIPS/DIPPING	The SLIDE RACK is moved up and down a programmable number of times on entry to a STATION.
DISENGAGE	The process by which the HEAD detaches itself from the SLIDE RACK after PUTDOWN or DIPPING.
ENGAGE	The process by which the HEAD attaches itself to the SLIDE RACK prior to PICKUP.
EXACT IMMERSION	The IMMERSION time is achieved within 1 second
EXIT DRAWER	Drawer into which SLIDE RACKS are placed by the instrument for subsequent collection by the user.
FUME EXTRACTION	A fan draws fumes through a filter which removes dangerous SOLVENT vapours.
HEAD (TRANSFER ARM)	XYZ device used to PICKUP, PUTDOWN, ENGAGE, DISENGAGE, DIP and move SLIDE RACKS from STATION to STATION.
IMMERSION TIME	The time a SLIDE RACK spends in a STATION. Timed from end of PUTDOWN to start of PICKUP.
LCD	The Liquid Crystal Display situated on the control panel.
LED'S	Light Emitting Diodes situated on the control panel and near LOAD and EXIT DRAWERS.

LOAD DRAWER	Drawer into which SLIDE RACKS are placed by the user and from which they are taken by the instrument for STAINING.
NON-EXACT IMMERSION	The IMMERSION TIME is achieved within -0,+ infinity seconds, ie. it specifies a minimum time period only.
OVEN	STATION through which warm air is blown in order to dry SLIDES and adhere tissue sections to them.
PC	Personal computer based on the original IBM architecture.
PICKUP	The SLIDE RACK is withdrawn from a STATION by the HEAD in such a way as to minimise CARRYOVER.
PROGRAM	Series of STEPS by which a SLIDE RACK undergoes STAINING in the instrument.
PUTDOWN	The SLIDE RACK is placed in a STATION by the HEAD.
REAGENT	Chemical used for STAINING.
REAGENT STATION	Container holding REAGENT into which SLIDE RACKS are placed by the instrument.
SETUP	Parameters which apply to the operation of the instrument independently of the program used, ie. OVEN temperature and DIPS setting.
SLIDE	Glass microscope slide 25m x 75mm x 1mm.
SLIDE RACK	Holds SLIDES to ease handling by the instrument.
SOLVENT	Organic liquid eg. Xylene, Ethanol.
STAINING	The process by which tissue sections are stained.

STATION	Location in the instrument where part of a STAINING sequence takes place.
STEP	Defined by the STATION, IMMERSION TIME and timing accuracy for one discrete event in the STAINING sequence.
TRANSFER ARM	See HEAD.
UNLOAD	The user removes a SLIDE RACK from the EXIT DRAWER or from the station in which it completes its programmed sequence.
UPS (BATTERY BACKUP)	Uninterruptable power supply which allows STAINING to continue during brief mains power failures.
WASH STATION	Container through which water flows to wash REAGENT from a SLIDE RACK and the SLIDES in it.

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