CRYOTOME®

STANDARD

ENGLISH

OPERATOR GUIDE

77210164 GB

SHANDON®

Life Sciences International (Europe) Limited is an ISO 9001 Approved Company.

4CEU01GB 1.11/96

OPERATOR GUIDE

LIST OF CONTENTS

WELCOME

1 INTRODUCTION

Welcome to the Cryotome® cryostat. Designed and made with care, the instrument is safe to use, simple to operate, and easy to maintain.

This Operator Guide gives instructions for its correct operation and use. The number by the side of each illustration is the same as the paragraph number of its associated text.

2 SAFETY

Shandon instruments are designed to operate safely and consistently for many years. However, incorrect actions by a user may damage the equipment, or cause a hazard to health. It is Important for you to know that:

i The instrument weighs approximately 150 Kilograms (330 lbs); get help to move or lift it.

ii Sharp components are used in this instrument. Make sure you understand the correct methods for fixing and use.

iii Be aware that there is always a danger of biological contamination when working with unfixed tissue. Make sure that the instrument is properly decontaminated at regular intervals.

iv Do not remove any panels or covers while the instrument is attached to a mains supply.

v This instrument must be properly connected to a good earth (Ground) via the mains input supply. All earth (ground) straps and connections MUST be replaced after service and before the Cryotome® is powered up.

In compliance with statutary requirements all our equipment is designed to accepted standards of safety. Its use does not entail any hazard if operated in accordance with the instructions given in this manual. However, you must obey the following safety precautions.

i All users must read and understand the Operator Guide, and only operate the unit in accordance with the instructions.

ii Potentially lethal voltages above 110v A.C. or 50v D.C. are present inside the unit. Do not remove any access covers unless specifically instructed to do so.

iii It is important that normal standards of safety and good laboratory practices are employed, **especially with respect to decontamination and cleaning procedures**. Always use common sense when operating the instrument.

iv Any problems and queries should be referred to our Service Department.

v Do not use the Cryotome® for general refrigeration purposes, such as storage of specimens. Use a conventional freezer.

vi Correct maintenance procedures are essential for consistent performance. It is recommended that a Maintenance Contract is taken out with our Service Department.

vii It is important that only factory approved accessories or replacement parts are used with the Cryotome.

3 UNPACKING

Transit fixings are attached to various internal structures to protect the instrument during transport. **IT IS ESSENTIAL THAT THESE ARE ALL REMOVED BEFORE AN ATTEMPT IS MADE TO OPERATE THE INSTRUMENT.**

Refer to Section 2 for full instructions relating to unpacking and installation.

4 WARRANTY

Full details of Warranty conditions are given in Section 9, together with a list of Distributor and Dealer addresses on Page 9.2.

5 WARNING NOTICES

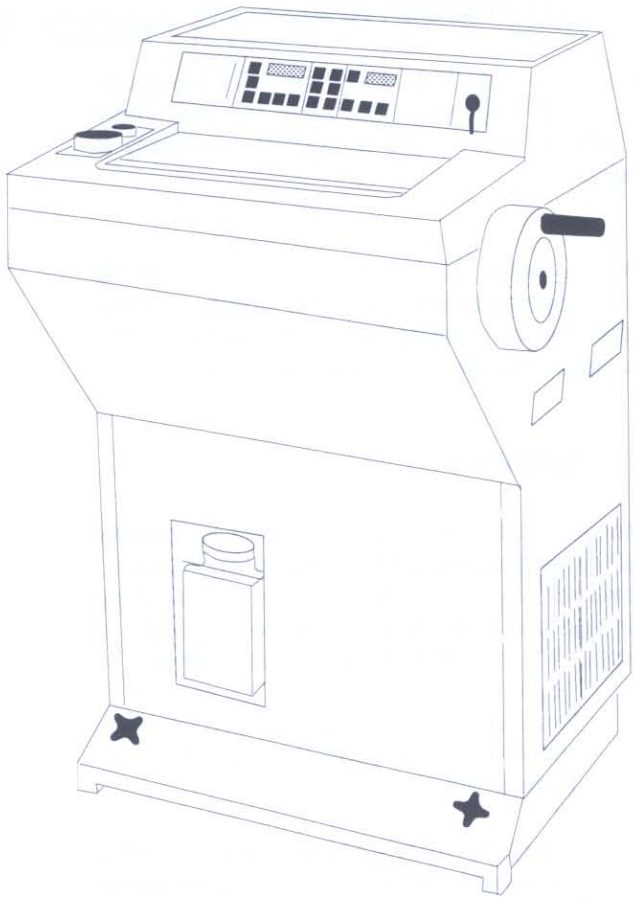
THIS SYMBOL IS USED ON THE EQUIPMENT, OR IN A DOCUMENT, TO WARN THAT INSTRUCTIONS MUST BE FOLLOWED FOR SAFE AND CORRECT OPERATION.

This symbol is used on the equipment or in the a document to warn that a hazard may exist due to an extreme of temperature.

WARNING **A warning is given in the document if there is a danger of personal injury or damage to equipment.**

Note

1 *Notes give more information about a job or instruction but do not form part of the instruction.*



CRYOTOME ® 0620

CE **Cryotome ® meets the following CE Mark requirements;**

Directive 89/336/EEC, as amended by 92/31/EEC & 93/68/EEC;

Low Voltage Directive 73/23/EEC, as amended by 93/68/EEC.

DESCRIPTION

1.1 OVERVIEW

1.1.1 The Cryotome® is designed for cutting frozen sections of fixed and unfixed specimens, rapidly and accurately, for future examination by microscope. It operates by rapidly freezing the sample in a temperature controlled environment, and provides means for sectioning the frozen sample by conventional microtome. For optimum performance, the microtome Specimen Head is held within the refrigerated chamber. The main body of the microtome is mounted outside the chamber to give more space for working in, and for easier cleaning.

1.1.2 Principal factors for good sectioning of frozen specimens are:

i the temperature must be correct for the specimen being cut.

ii the microtome must be correctly adjusted and operated.

iii the cutting blade must be sharp and set at the correct angle.

iv the anti-roll plate must be correctly adjusted.

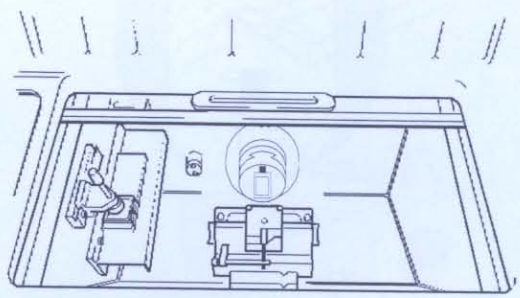
1.1.3 The Cryotome® meets these objectives. With a proven design of rotary microtome, and an efficient cooling system, mechanical stability is ensured while the correct working temperature is maintained.

1.1.4 The main body of the microtome outside the refrigerated chamber connects to the **SPECIMEN HEAD** via a thermal barrier that also serves to provide a biological screen.

TABLE 1

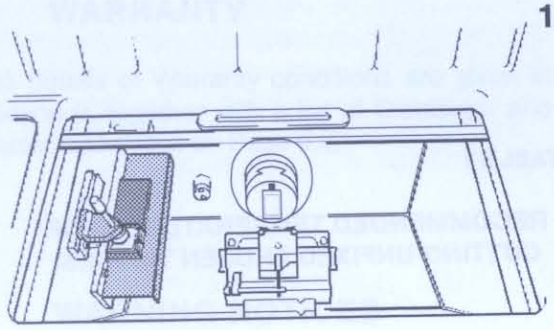
RECOMMENDED TEMPERATURES FOR CUTTING UNFIXED FROZEN TISSUES.

TISSUE TYPE	WORKING TEMP.(°C)
Brain	-12
Liver	-14
Lymph Node	-14
Kidney	-16
Spleen	-16
Muscle	-20
Thyroid	-20
Skin	-25
Breast	-25
Breast with fat	-30 or below
Adipose tissue	-30 or below
Fixed Tissue	-12 to -17



1.1.4

1.1.5

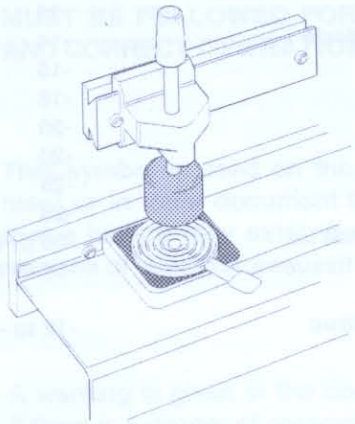


1.1.5 Ultra rapid freezing of specimens is achieved by use of the Cryoboost facility. This employs the **CRYOBAR** refrigerated bar on the left sidewall of the refrigerated chamber, and an electrically operated peltier element. The shelf around the bar is maintained at the Working Temperature.

Note

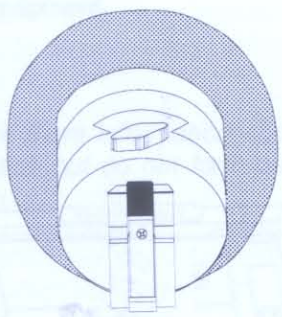
1 The Cryobar is situated on the refrigeration pipework and its temperature can vary considerably. Do not use the Cryobar for storing specimens.

1.1.6



1.1.6 Pressing the **[CRYOBAR BOOST]** push-button on the Control Panel activates the peltier element in the Cryobar. A Cryocassette is then placed on the peltier and a specimen - usually embedded in a medium such as Shandon Cryochrome™ - is frozen to the top surface of the Cryocassette. An aluminium heat sink lowered on to the specimen speeds up the freezing process.

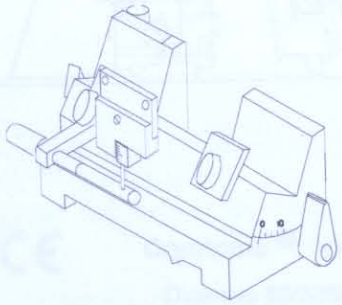
1.1.7



1.1.7 The cryocassette, with specimen now frozen on its top surface, is removed from the Cryobar and transferred to a CRYOCASSETTE HOLDER on the SPECIMEN HEAD. Four types of Specimen Head are available; one uses adaptor 0620-820 for use with Specimen Tube type Cryocassettes, the others accept flat, square backed, Cryocassettes as follows:

i Cryocassette Head (0620-818) [FITTED]
ii Fine Adjust Orientating Head (0620-006)
iii Simple Orientating Head (0620-008)

1.1.8

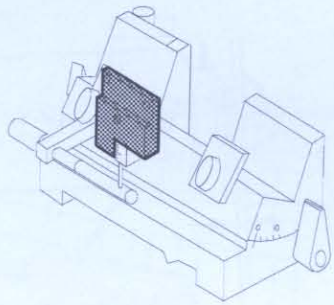


1.1.8 Cutting is performed using a special **KNIFE HOLDER,** of which there are three types:

i Solid knife Holder (0620-023)
ii Lo-Profile blade Holder(0620-021L)
iii Hi-Profile blade Holder(0620-021H).

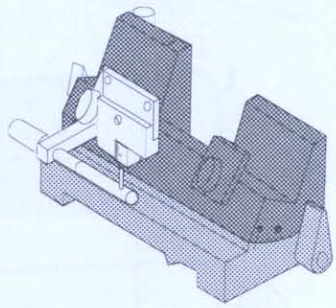
1.1.9 Each type of Holder is specifically designed to accept one style of blade only. Both the Lo-Profile and Hi-Profile Holders are for use with disposable blades, and all knife-holders, feature an **ANTI ROLL PLATE** that prevents curling of the cut section.

1.1.9



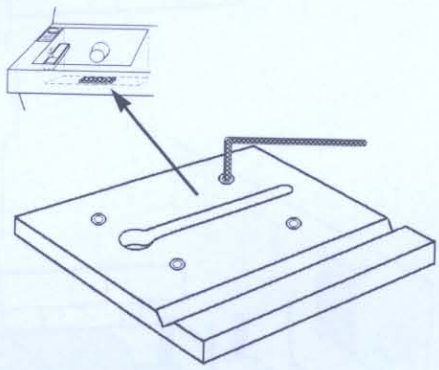
1.1.10 The knife Holder is constructed of two parts - a Top and a Base. The Top holds the blade or knife, and the Base supports the Top. There are three types of Top to suit the types of knife or blade. The same Base supports all versions of Top.

1.1.10



1.1.11 The assembled Top and Base of the knife Holder fix onto the **CARRIAGE** on the floor of the Refrigerated Chamber. Four Allen screws hold the Carriage in place and attach it to the body of the microtome outside the Refrigerated Chamber. These Allen screws must be kept tightly fastened to prevent movement of the Holder - and hence the blade - with respect to the Specimen Head which is essential for good sectioning.

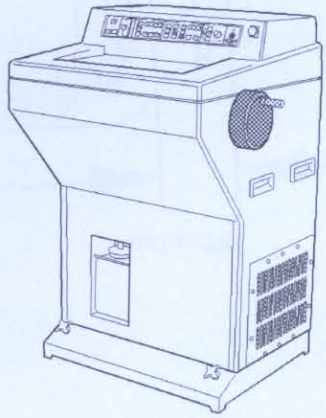
1.1.11

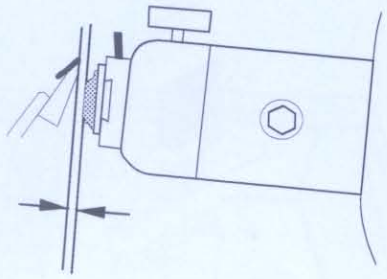


WARNING **Do not undo or remove the Allen screws or the whole of the Microtome assembly will fall and cause considerable damage.**

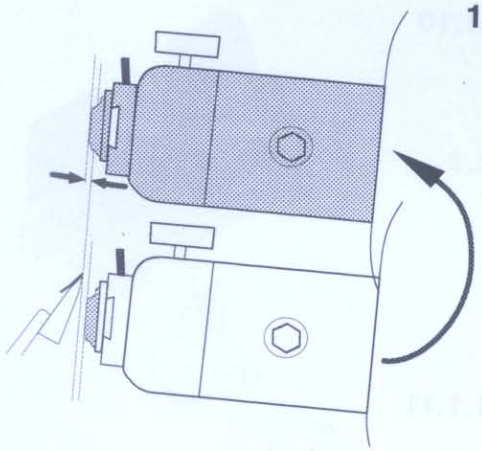
1.1.12 The **FLYWHEEL** on the righthand side of the instrument controls the movement of the Specimen Head.

1.1.12



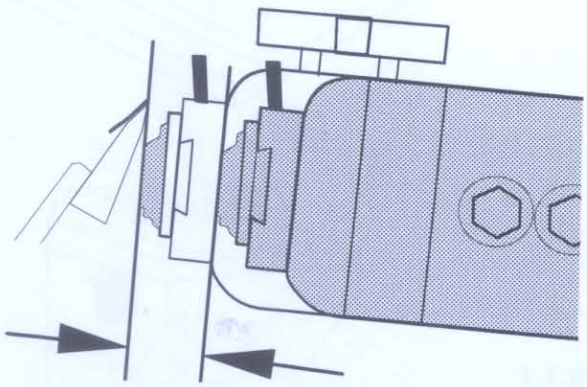


1.1.13 When the Specimen Head is at the lowest part of its downward stroke (Bottom) it is **RETRACTED** a preset distance of approx. 100 microns from the cutting plane.



1.1.14 Just before the Specimen Head attains its maximum height on the return stroke, (Top), the **ADVANCE** function moves the Specimen Head forward between 1 and 30 microns. The distance advanced is controlled by the **MICRON SELECTOR** knob on the Minor Control Panel.

1.1.15 When the Specimen Head has advanced as far as the mechanism allows, all segments of the Specimen Travel Available bar graph are lit, and an audible alarm operates.



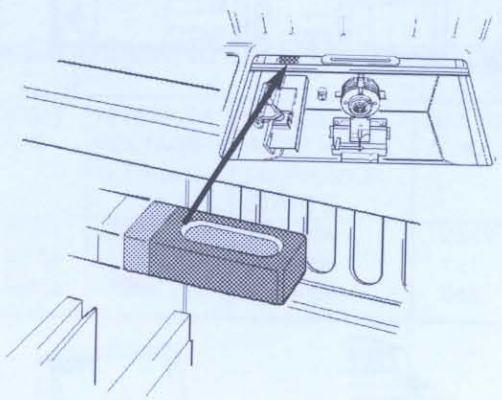
12,000µm

1.1.16 The **REWIND/ADVANCE** knob of the Minor Control Panel provides means to rewind the Specimen Head back to the 'Maximum Travel Available' position. As the Specimen Head is rewound by turning the REWIND /ADVANCE knob clockwise, the number of lit segments in the bar graph reduces until only the first segment flashes, and the sounder operates. This indicates that the 'Maximum Travel Available' position is reached.

1.1.17 The sounder is silenced, and the first segment returned to steady lit status, when the REWIND/ADVANCE knob is rotated slightly anti-clockwise (Advanced). Total travel available for advancement of the Specimen Head is then 12,000 microns.

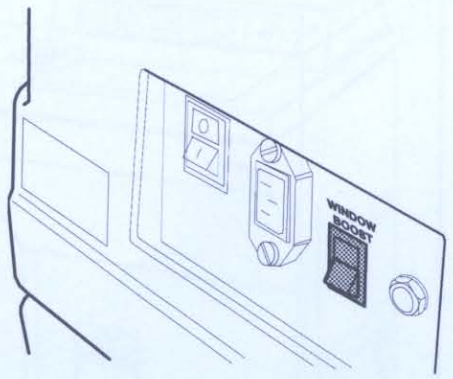
1.1.18 A trough, fitted behind the Cryobar on the rear wall of the Refrigerated Chamber accommodates approximately 2 ml of concentrated Formalin. Pressing **[IMMED FUMIGATE]** on the Control Panel, causes the trough to heat up and evaporate the Formalin during the course of a fumigation cycle. The formalin vapour (formaldehyde) decontaminates the working chamber. For safety, the fumigation cycle cannot take place if the window is not closed and locked.

1.1.18



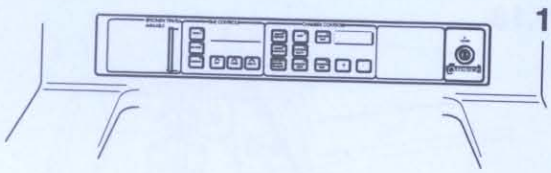
1.1.19 The window is double glazed and contains an electrical de-misting element that is held permanently energised during normal operation of the Cryotome®. The window slides backward, under the Control Panel, to give access to the Refrigerated Chamber and is lockable when closed. A window-locked indicator on the Control Panel confirms this status.

1.1.20



1.1.20 A **WINDOW BOOST** switch next to the mains supply socket at the rear of the instrument provides facility for adding extra de-misting power in conditions of high humidity.

WARNING **USE OF THE WINDOW BOOST FACILITY SHOULD BE KEPT TO A MINIMUM OR PERFORMANCE MAY BE ADVERSELY AFFECTED.**



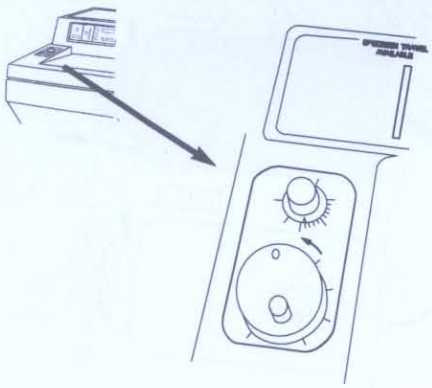
1.2.21

1.2.21 The fascia of the **MAIN CONTROL PANEL** is integrated into the top deck of the instrument and provides means to:

i read and set temperatures,

ii set the start times of the defrost and fumigation cycles.

iii prevent unauthorised use.



1.2.22

1.2.22 A horizontal **MINOR CONTROL PANEL**, to the left of the window, has a small diameter knob for setting specimen advance, and hence thickness, and a larger diameter rotary control for REWIND/ADVANCE functions. The arrow shows the direction for specimen advance.

1.1.23 Good illumination of the working area is ensured by a fluorescent strip light under the top cover of the control panel. It is controlled from the **[LAMP]** push-button switch on the control panel.

INSTALLATION INSTRUCTIONS

2.1 PROCEDURE

2.1.1 Check that the detail on the label of the crate corresponds with the Purchase Order, and that the power supply capability of your local socket outlet is compatible with the power demand of the Cryotome.

THE CRYOTOME IS HEAVY (150 Kgs 330 LBS) GET HELP TO MOVE OR LIFT IT.

2.1.2 Move the crate near to where the instrument is to be sited. Cut the retaining straps then lift the outer case vertically. Read the label on the rear of the instrument and check that it conforms with your order.

2.1.3 Retrieve the accessories pack from on top of the pallet in front of the instrument, then lift the Cryotome off the Pallet. Check that the Accessories Pack contains:

- i Pack of Five Cryocassettes.
- ii One Shelf.
- iii One Debris Tray.
- iv One Flywheel Assembly.
- v One Flywheel Bolt.
- vi One Flywheel Bolt Key.
- vii Mains Lead.
- viii One Brush - for sections.
- ix Two Keys - front Panel.
- x Tools.
- xi Operator Guide.

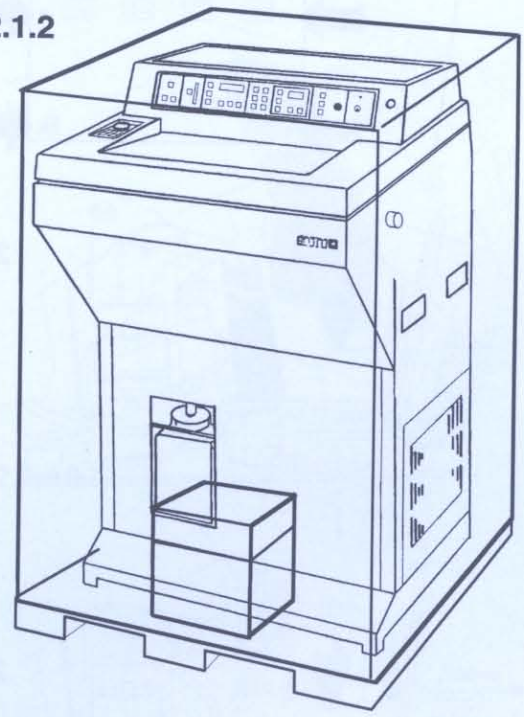
POWER DEMAND CHARACTERISTICS

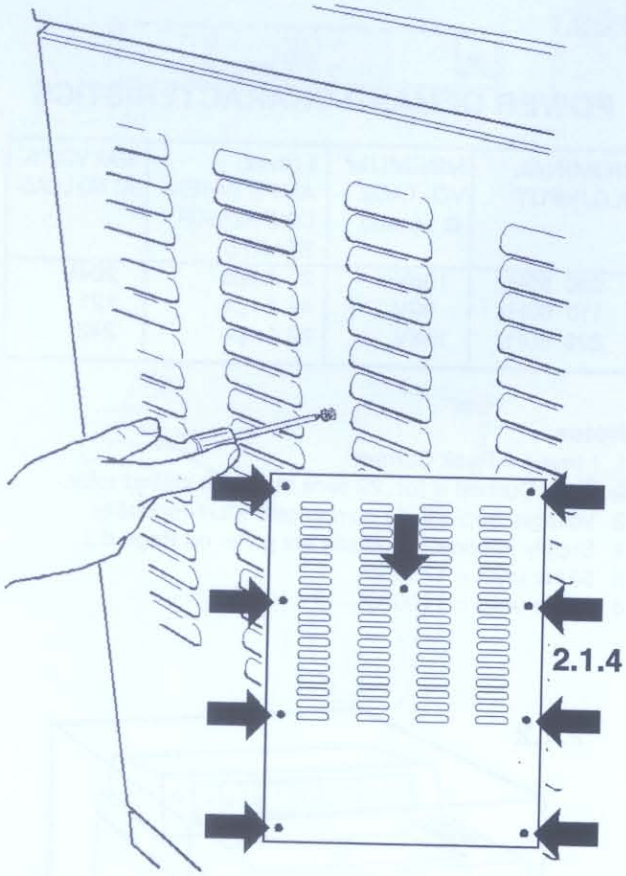
NOMINAL A.C.INPUT	MINIMUM VOLTAGE @ I (max)	I (max) = AMPS WHEN COMPRESSOR STARTS	MAX VOLTS AT NO LOAD
230 50Hz	198V	20 Amps	264V
110 60Hz	99V	44 Amps	121
220 60Hz	198V	20 Amps	242

Notes

1 I (max) = Peak Current
2 Peak Current is for 22 secs max with stalled rotor.
3 Voltage drop affects compressor start capability.
4 Supply impedance details are given on Page 8.2.
5 50 Hz units = 1700 VA
6 60 Hz units = 1400 VA

2.1.2





2.1.4

Note

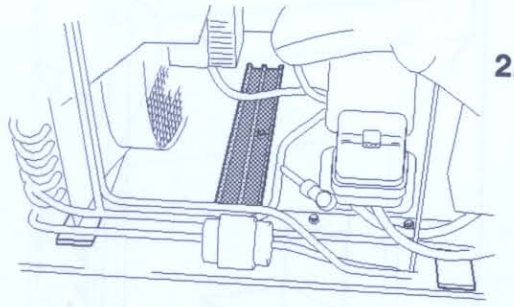
1 Inform your Shandon dealer immediately if there are any breakages or shortages. Quote your Order Number, the Invoice Number, Delivery Note number and the date.

WARNING **Always keep the instrument vertical to prevent damage to the refrigeration system.**

Note

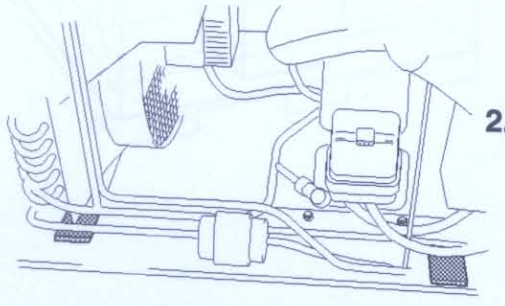
1 Store all the transit fixings for future use when transporting the Cryotome.

2.1.4 Undo and remove the bolt from the centre of the rear panel. Undo the (8) screws that retain the rear panel then pivot the panel carefully around its lefthand side, (seen from the rear). Lean the panel gently against the lefthand side panel. DO NOT DISTURB THE EARTH WIRE THAT IS CONNECTED TO THE REAR PANEL.



2.1.5

2.1.5 Undo and remove the red transit bracket from between the compressor and the fan.

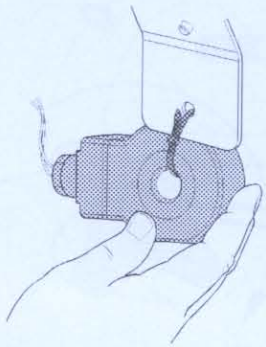


2.1.6

2.1.6 Remove the two red wooden packing pieces from under the compressor assembly.

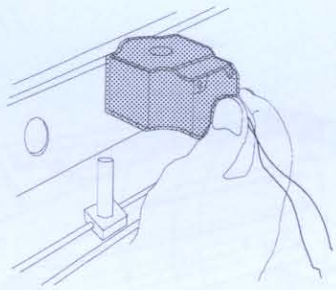
2.1.7 Hold the blue plastic coil of the defrost valve firmly on the transit plate at the back of the microtome, then cut the ties that hold the valve .

2.1.7



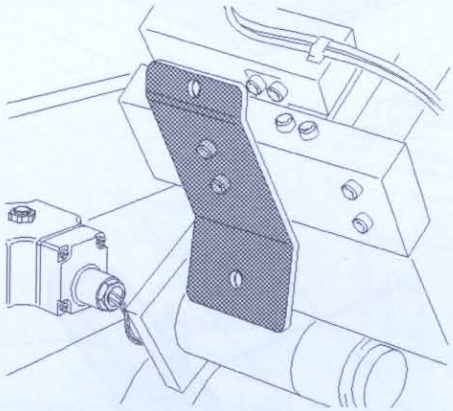
2.1.8 With the coil of the defrost valve still connected to the white wires, place the coil over the tube that projects upward from the copper tube on top of the compressor cooling matrix. Release the blue plastic components and fit the nameplate, the washer, and then the nut to hold the coil of the defrost valve in position. Fit the pastic plug in the hole in the centre of the rear panel

2.1.8



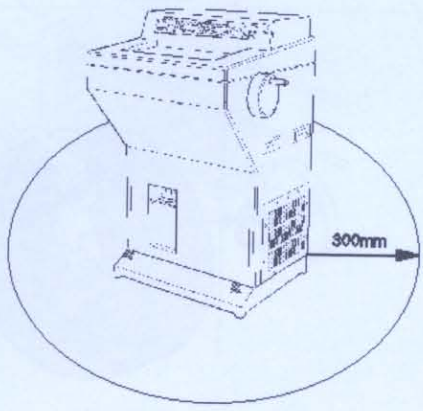
2.1.9 Undo and remove the transit plate that supported the defrost valve. Replace the rear panel. Retain the transit plate for future use when moving the Cryotome®.

2.1.9



2.1.10 Move the instrument to its permanent location. This must be **level** and provide a 300 mm (12 inch) clearance to the sides and rear of the instrument for ventilation.

2.1.10

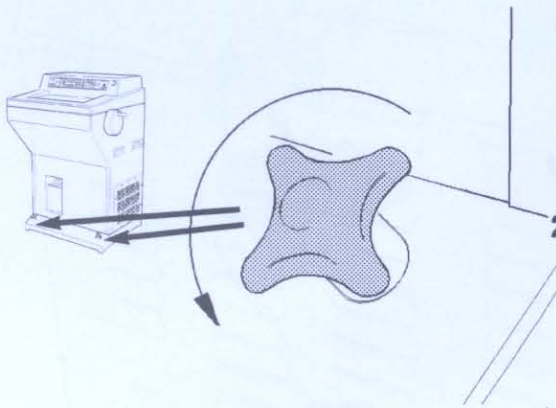


Note

1 *Inadequate ventilation may have an adverse effect on the cooling system. The recommended ambient temperature is 20°C (68°F); maximum =35°C (95°F). Performance is adversely affected at ambient temperatures above 30°C (86°F).*

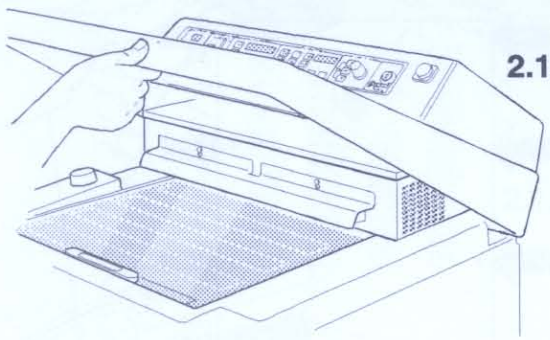
2 *Siting of the instrument on an uneven*

surface can have an adverse effect on the cooling system. Make sure that the unit is level.



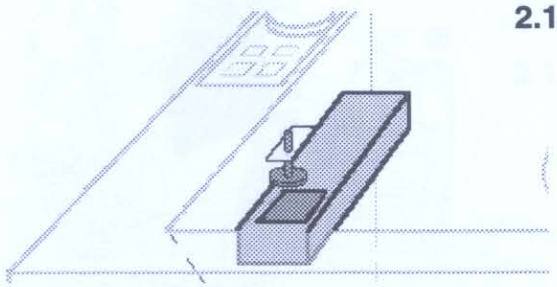
2.1.11

2.1.11 Turn the adjustment knobs counter-clockwise until the feet of the instrument are on the floor. The retraction knobs can be unscrewed completely and removed if preferred.



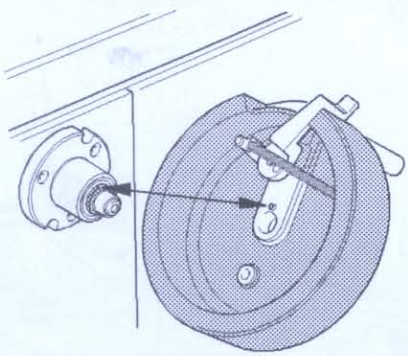
2.1.12

2.1.12 Raise the front edge of the top cover, remove the transit packing from the top of the sliding window, then lower the cover back into position. Push open the sliding window to to gain access to the Refrigerated Chamber.



2.1.13

2.1.13 Remove the rubber band and any other packing material from the area around the Cryobar on the lefthand wall of the Refrigerated Chamber.



2.1.14

2.1.14 Slide the flywheel carefully onto the drive shaft at the top of the righthand side panel. The flywheel is supplied in the Accessory Pack. Make sure that the locating pin of the flywheel fits into the key-way of the drive shaft.

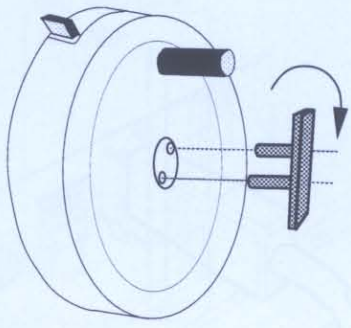
Note

1 *The lever next to the flywheel handle is used to lock the flywheel and prevent inadvertent rotation.*

2.1.15 Fit the flywheel bolt then use the special

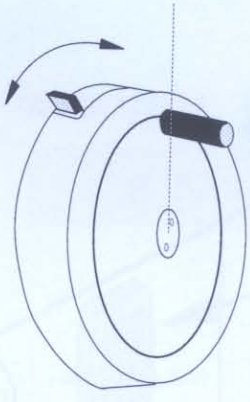
Flywheel Bolt Key to turn the retaining bolt clockwise to tighten. Rotate the flywheel and check that movement is smooth and produces a corresponding movement of the Specimen Head.

2.1.15



2.1.16 Turn the flywheel until the handle is at the 12 o'clock position then push the lever of the lock away from you. Check that the lock operates and that the flywheel cannot rotate.

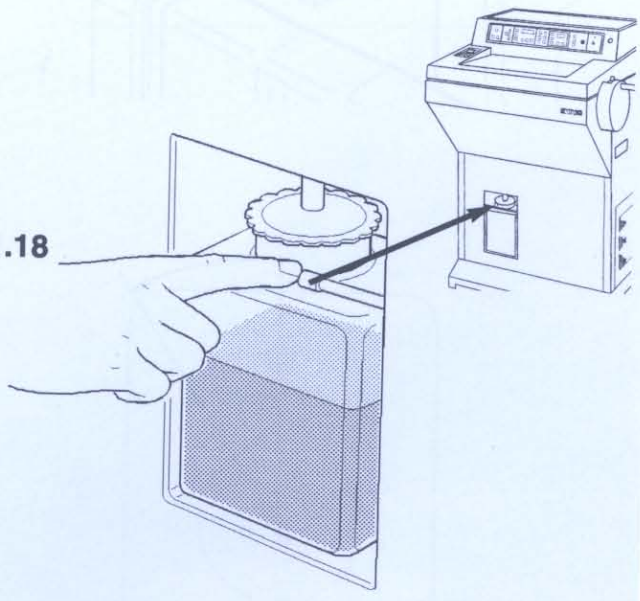
2.1.16



2.1.17 Move the lock lever towards you and check that the flywheel rotates smoothly and produces vertical oscillations of the Specimen Head. Check also that the lock operates at the 'quarter past' and 'half past' the hour clock positions.

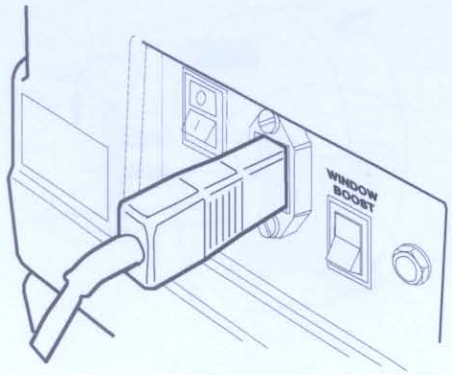
2.1.18 Slide the waste bottle retaining bar to the right, and remove the Waste Bottle. Use a 10% solution of Formalin to fill the Waste Bottle sufficient to cover the outlet tube - approximately 15mm (1/2 inch) deep. The lid of the waste bottle turns counter clockwise to undo.

2.1.18



KEEP SUFFICIENT FORMALIN SOLUTION TO COVER THE END OF THE OUTLET TUBE IN THE WASTE BOTTLE AT ALL TIMES TO PREVENT THE RELEASE OF AEROSOLS OR CONTAMINANTS DURING USE

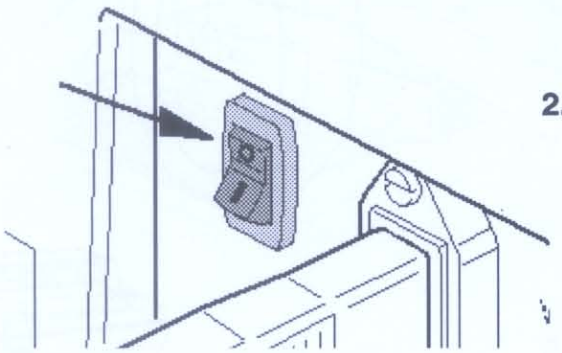
2.1.19 Select the appropriate mains lead from



2.1.19

those supplied and plug it into the mains inlet socket in the rear panel of the instrument.

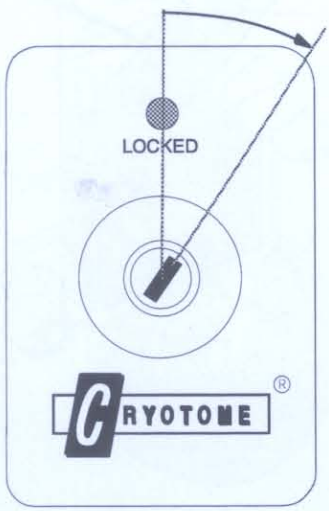
MAKE SURE THAT BODY OF THE INSTRUMENT IS EARTHED (GROUNDED). A PROPRIETARY GROUND FAULT CIRCUIT INTERRUPTION DEVICE (EARTH LEAK DETECTION) MAY BE FITTED AT THE WALL SOCKET AS AN EXTRA SAFEGUARD



2.1.20

2.1.20 Make sure that the **I / O** power switch at the rear of the instrument is set to off (**O** side pushed inward).

2.1.21 Connect the mains supply cable to the local power supply outlet. The Cryotome® is now fully installed, and ready to be set up for operation.



2.1.23

2.1.23 Insert the key in the keyswitch of the Control Panel and turn it clockwise. The LOCKED indicator is not lit when the panel is unlocked and available for use.

2.1.24 Check that the following occur:

i ALL lights and indicators of the Control Panel light for three seconds.

ii the SPECIMEN TRAVEL AVAILABLE bar chart remains flashing.

iii 'P FAIL' shows in the TIME CONTROLS display (unless the internal battery is' discharged in which case the indication is ' rESEt').

Note

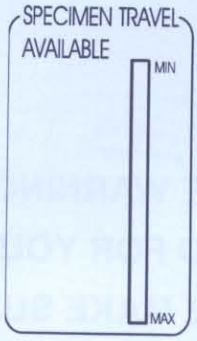
1 *Rewind the Specimen Head to give Maximum Travel Available i.e only one segment flashes.*

2 *Advance the Specimen Head to stop the single segment flashing and to silence the sounder.*

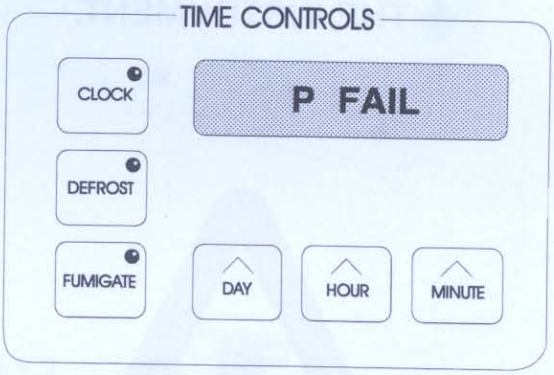
2.1.25 Press [CLOCK] to clear the flashing display. The compressor starts operating within three minutes if the working temperature set in the TEMPERATURE°C display is less than the current temperature of the Refrigerated Chamber.

WARNING **Consult your Shandon dealer if the Cryotome® is to be moved. Transit fixings must be fitted and the instrument must be kept upright.**

2.1.24.i



2.1.24.iii



THESE WARNINGS ARE INCLUDED FOR YOUR SAFETY. PLEASE MAKE SURE THAT YOU READ AND UNDERSTAND THEM BEFORE OPERATING THE INSTRUMENT.

WARNING Practice good biological safety procedures whenever the Cryotome is used.

WARNING Make sure that the Waste Bottle has sufficient 10% Formalin solution to cover the outlet pipe.

WARNING Do not use the Cryotome for general laboratory refrigeration purposes.

WARNING Fumigate regularly to ensure decontamination of the Refrigeration Chamber and accessories.

WARNING Use mesh gloves when handling knives and blades.

WARNING Use the correct type of knife or blade appropriate for the knife holder.

WARNING Make sure that the knife guard is correctly installed.

WARNING If you know that a specific virus or bacteria is likely to be present in the specimen, make sure that you are aware of a suitable decontaminant before you introduce the specimen into the Refrigerated Chamber.

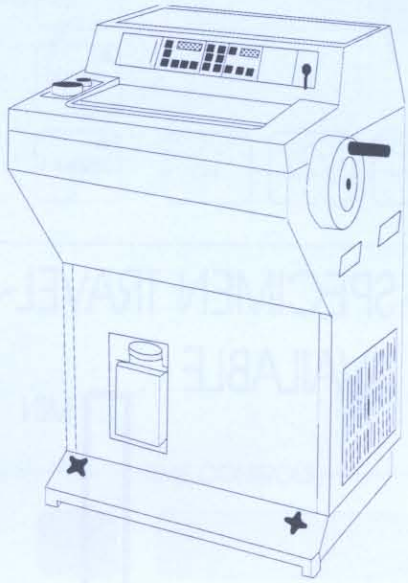
WARNING Always make sure that the window is closed before any sections are cut. Aerosols can form when the specimen traverses the knife. These can be injurious to health if inhaled.

CONTROLS

3.1 DESCRIPTION

3.1.1 The **MAIN CONTROL PANEL** comprises groups of touch sensitive wipe-clean membrane switches and associated liquid crystal displays (LCD). There is no 'feel' when a switch operates. Operation is confirmed by an audible tone, a change in the display, or by an integral pushbutton indicator.

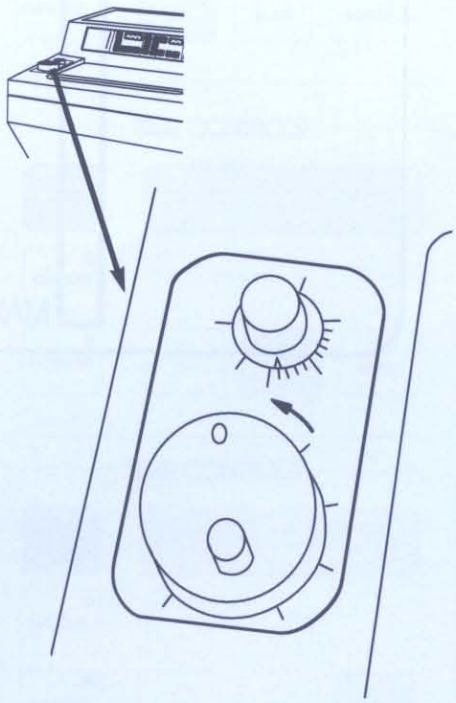
3.1.1



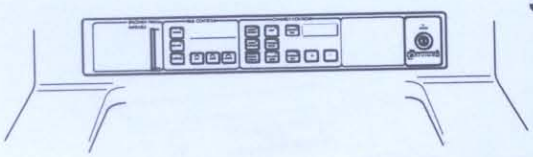
3.1.2 After a push-button is pressed its indicator flashes yellow while the instrument is making adjustments. The indicator shows steady yellow when the required status is achieved. Display panels show instrument status and error messages.

3.1.3 The **MINOR CONTROL PANEL** is mounted horizontally to the left of the window and contains two rotary control knobs. The smaller knob - the section thickness control, or MICRON SELECTOR - sets the distance that the Specimen Head advances after each cutting stroke, and hence the thickness of the section. The range is 0-30 µm in increments of 1 µm.

3.1.3



3.1.4 The larger knob is for coarse adjustment of the position of the Specimen Head. This REWIND/ADVANCE control used is also used to retract the Specimen Head to the Maximum Travel Available position. Rotate the knob clockwise to rewind; anti-clockwise to advance. One revolution of the knob equates to a movement of 100 µm at the Specimen Head.



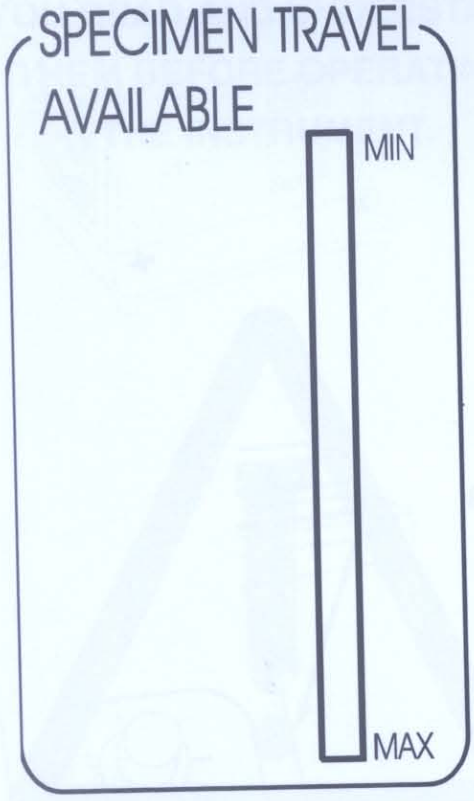
3.1.5

3.1.5 The Main Control Panel is divided into the following sections to provide for controlling the operation of the Cryotome® :

i SPECIMEN TRAVEL

ii TIME CONTROLS

iii CHAMBER CONTROLS



3.2.1

3.2 SPECIMEN TRAVEL

3.2.1 The vertical bar graph contains separate segments that light up sequentially as the Specimen Head advances from its maximum available travel position. The proportion of lit to unlit segments indicates the amount of travel still available at any time.

3.2.2 After the instrument is powered up, the REWIND/ADVANCE control knob of the Minor Control Panel is used to move the Specimen Head to its Maximum Travel Available position. The the first segment in the bar graph then flashes and a sounder operates to indicate that the Specimen Head is in its fully rewound position (MAX travel available). Turn the REWIND/ADVANCE knob slightly anti-clockwise (ADVANCE) to silence the sounder and stop the flashing.

3.2.3 At the end of each cutting stroke the Specimen Head advances by the distance set by the MICRON SELECTOR (section thickness) control. Eventually, all the available travel gets used up and the 'end of travel' position is reached. The sounder then operates, and all the segments in the bar graph are lit. The Specimen Head must then be rewound manually, using the REWIND/ADVANCE knob.

3.3 TIME CONTROLS

3.3.1 The time setting controls comprise:

i three illuminating push-buttons.
ii three non illuminating push-buttons,
iii an LCD display panel.

3.3.2 The illuminating push-buttons flash while an adjustment is being made after being pressed. Real time shows in 24 hour clock format, and a flashing colon (:) shows that operation is normal.

3.3.3 The **TIME CONTROLS** push-buttons facilitate setting:

i CLOCK display

ii DEFROST times

iii FUMIGATE times

3.4 TO SET THE CLOCK

3.4.1 To set the day press and hold **[CLOCK]** then press **[DAY].** Release the push-buttons when the correct day (1-7) shows in the display.

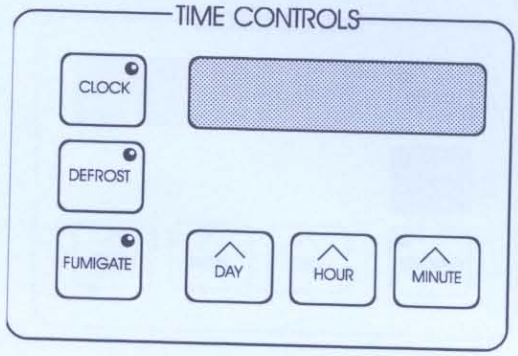
Note

1 Keep Monday as Day 1 to avoid confusion.

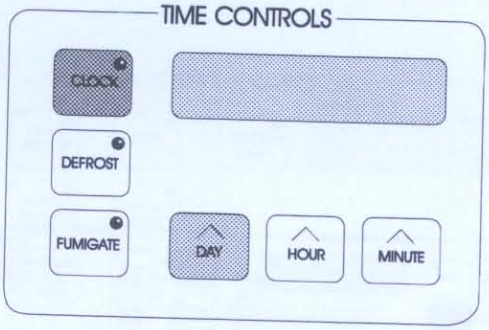
3.4.2 To set the time press and hold **[CLOCK]** then press **[HOURS].** Release the push-buttons when the correct hour (0-23) shows in the display.

3.4.3 To set the minutes press and hold **[CLOCK]** then press **[MINUTES].** Release the push-buttons when the correct minutes (0-59) show in the display.

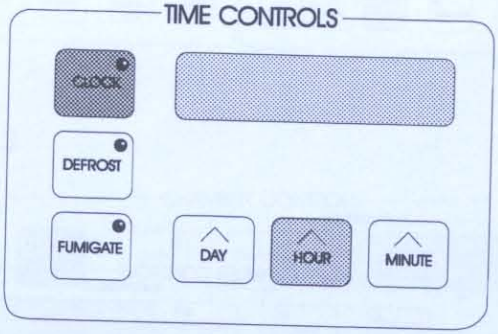
3.3.1



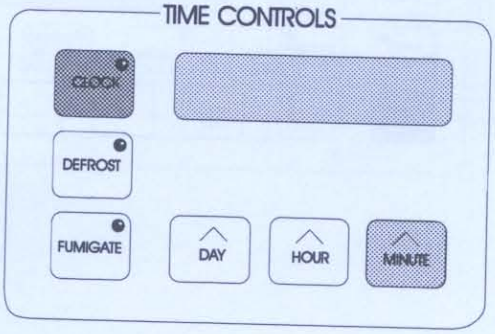
3.4.1

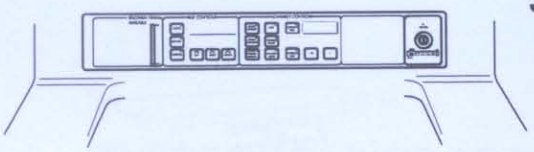


3.4.2



3.4.3





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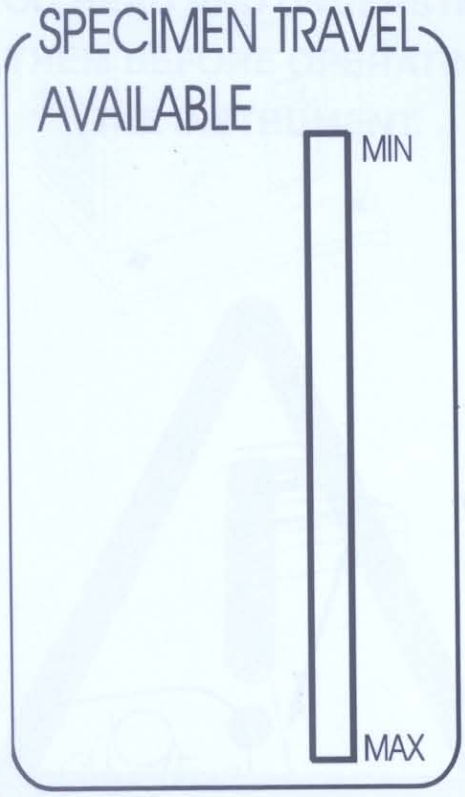
iii CHAMBER CONTROLS



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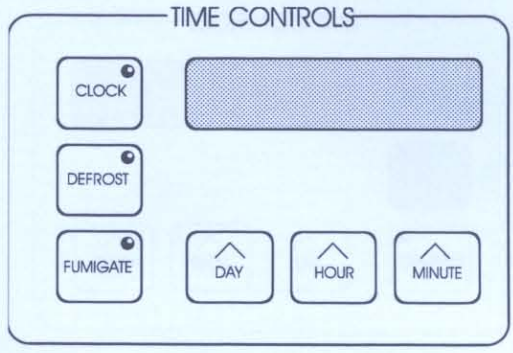
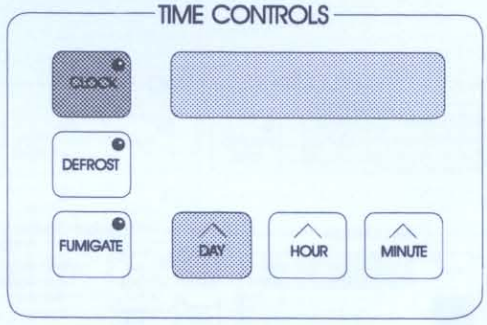
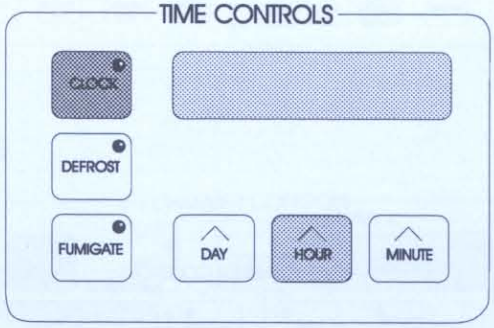


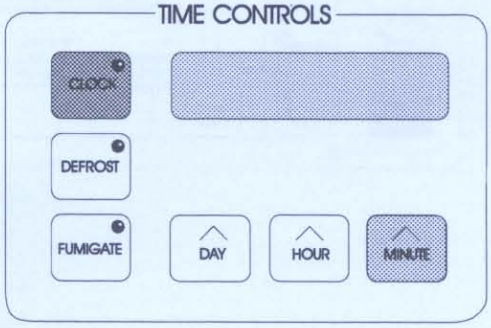
3.4.1



3.4.2



3.4.3



3.6 TO SET FUMIGATE TIMES

3.6.1 As for SET DEFROST (3.5.1 to 3.5.5) but read **[FUMIGATE]** for **[DEFROST].** Press **[IMMED FUMIGATE]** instead of **[IMMED DEFROST]** to enter (PSAVE) mode. This starts the 5 hour FUMIGATE cycle before going into (PSAVE).

3.7 CHAMBER CONTROLS

3.7.1 Chamber controls comprise a group of six push-buttons for dynamic functions such as switching on and off, with a second group of temperature control push-buttons and an LCD to their right.

3.7.2 The dynamic switches are:

i IMMED DEFROST

ii IMMED FUMIGATE

iii CANCEL DEFROST/FUMIGATE

iv LAMP

v CRYOBAR BOOST

vi WINDOW LOCK

3.7.3 Press **[IMMED DEFROST]** to activate the defrost heater of the heat exchanger which remains on for 5 minutes. The refrigeration coils and the cryobar also defrost during this time. In addition:

i the compressor switches on,

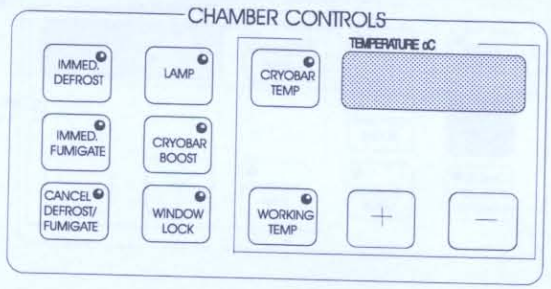
ii Cryobar Boost is switched off,

iii **[IMMED DEFROST]** is lit,

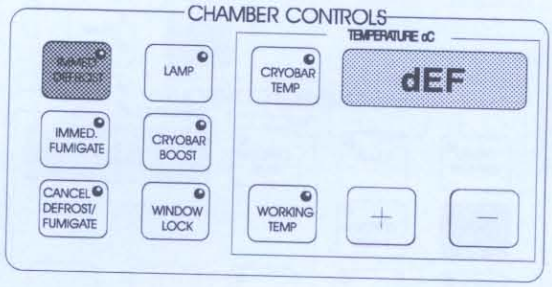
iv **dEF** shows in the TEMPERATURE °C.

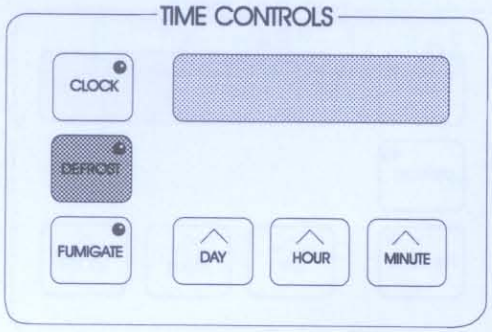
v After 5 minutes the defrost heater and compressor switch off for 10 mins. to allow the condensate to drain.

3.7.2



3.7.3





3.5.1

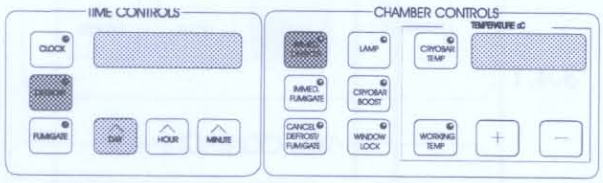
3.5 TO SET DEFROST TIMES

3.5.1 Proceed as above (3.4.1 to 3.4.3) but use **[DEFROST]** instead of **[CLOCK]**. Set the day at any value between 0 and 9 as follows: (Day 0 is used if you do not require the programmed function to be performed)

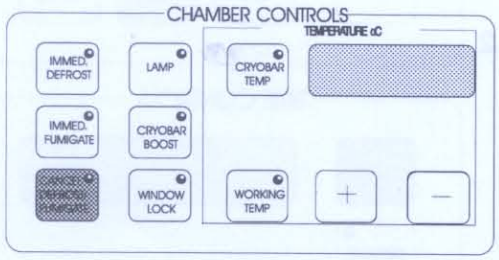
DAY 0 = prevents the programmed function.
DAY 1-7 = defrosting starts at the time set on the day shown (set Monday as Day 1 to avoid confusion).
DAY 8 = defrosting starts at the set time **every day**
DAY 9 = STANDBY (PSAVE = power save)

3.5.2 Standby (PSAVE) allows the instrument to remain switched on in a defrosted state for up to 24 hours until a pre-determined time. It then returns to its normal operational state

3.5.3



3.5.3 **TO SET STANDBY (PSAVE)** mode press and hold **[DEFROST]** then select **DAY 9** Set the time that normal operation is required to resume. Release the push-buttons. To start (PSAVE) mode immediately press **[IMMED DEFROST]** . The instrument then runs its defrost cycle for 15 mins and goes to (PSAVE) on completion. You can use **[CANCEL DEFROST/ FUMIGATE]** to terminate the function before the cycle is complete. Fumigation can only be cancelled at specific times (Note 2, Page 3.6).



3.5.4

3.5.4 Press **[CANCEL DEFROST/FUMIGATE]** on the CHAMBER CONTROLS panel to resume normal operation after PSAVE .

Note

1 *It can take 1 - 2 hours after (PSAVE) mode to cool the Refrigerated Chamber sufficiently for use. Make allowance for this when setting the resume time.*

3.6 TO SET FUMIGATE TIMES

3.6.1 As for SET DEFROST (3.5.1 to 3.5.5) but read **[FUMIGATE]** for **[DEFROST].** Press **[IMMED FUMIGATE]** instead of **[IMMED DEFROST]** to enter (PSAVE) mode. This starts the 5 hour FUMIGATE cycle before going into (PSAVE).

3.7 CHAMBER CONTROLS

3.7.1 Chamber controls comprise a group of six push-buttons for dynamic functions such as switching on and off, with a second group of temperature control push-buttons and an LCD to their right.

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i IMMED DEFROST

ii IMMED FUMIGATE

iii CANCEL DEFROST/FUMIGATE

iv LAMP

v CRYOBAR BOOST

vi WINDOW LOCK

3.7.3 Press **[IMMED DEFROST]** to activate the defrost heater of the heat exchanger which remains on for 5 minutes. The refrigeration coils and the cryobar also defrost during this time. In addition:

i the compressor switches on,

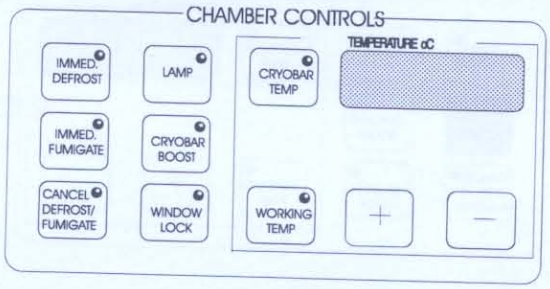
ii Cryobar Boost is switched off,

iii **[IMMED DEFROST]** is lit,

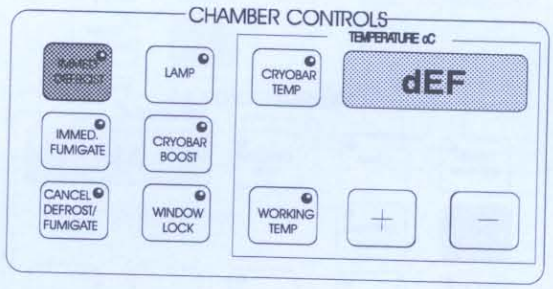
iv **dEF** shows in the TEMPERATURE °C.

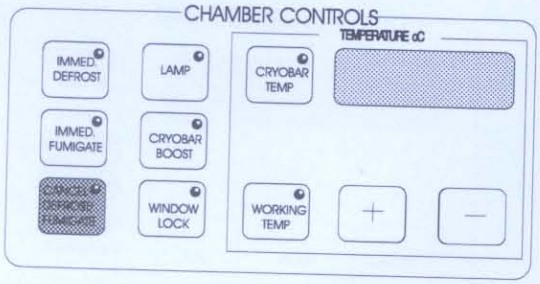
v After 5 minutes the defrost heater and compressor switch off for 10 mins. to allow the condensate to drain.

3.7.2



3.7.3





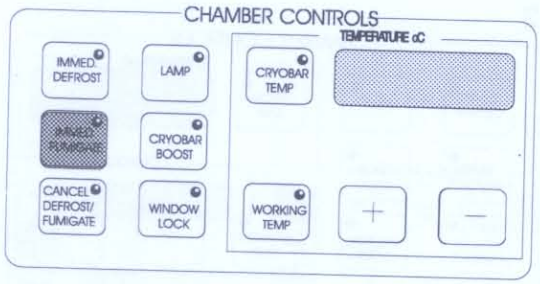
3.7.4

3.7.4 Defrosting stops after 15 minutes and the instrument reverts to its previous state. Defrosting cannot take place if the Chamber or Cryobar temperature exceeds 0°C. Pressing **[CANCEL DEFROST/FUMIGATE]** terminates defrosting.

Note

1 The compressor will not restart until 3 minutes has elapsed since it stopped.

3.7.5 If the DAY 9 option is selected when setting the defrost times, then the instrument enters STANDBY (PSAVE) mode when defrosting finishes.



3.7.6

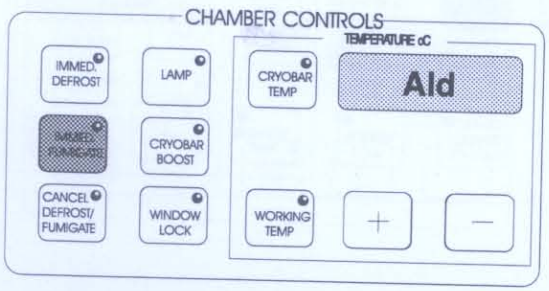
3.7.6 Pressing **[IMMED FUMIGATE]** initiates the following sequence:

Notes

*1 The window MUST be shut and locked before fumigation can start. If **[IMMED FUMIGATE]** is pressed when the window is not shut and locked, **Err 4** is displayed and the fumigate cycle is aborted.*

*2 **[CANCEL DEFROST/FUMIGATE]** only cancels FUMIGATE during stages iii and iv that follow. Stages v and vi cannot be cancelled.*

3.7.6 i



i the **[IMMED FUMIGATE]** push-button indicator lights and the display shows **Ald** (Formaldehyde).

ii the window lock is activated if the window is not already locked by manual use of the **[WINDOW LOCK]** push-button.

iii a 5 minute defrost is started, then....

iv the compressor is switched off and a one hour defrost starts,

v the Formalin trough is heated to 120°C for 45 minutes

vi the heater is switched off and fumigation takes place over four hours.

vii the instrument reverts to its previous setting when the fumigate cycle is finished.

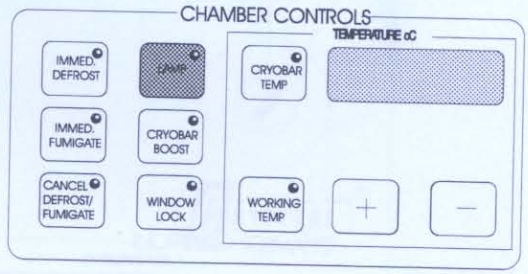
3.7.7 If the DAY 9 option is selected when the fumigation time is set, then the instrument enters STANDBY (PSAVE) mode when fumigation finishes.

3.7.8 Press **[CANCEL DEFROST/FUMIGATE]** to terminate a DEFROST or FUMIGATE sequence. The pushbutton indicator remains lit until termination is completed.

3.7.9 Pressing the **[LAMP]** push-button switches on the fluorescent lamp to illuminate the work area. The push-button indicator is lit when the light is on. The next press switches off the lamp and indicator.

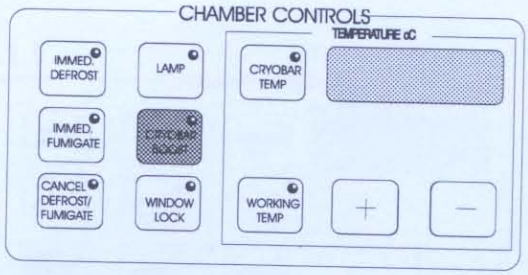
3.7.10 Pressing **[CRYOBAR BOOST]** energises the peltier element in the Cryobar. The boost is activated for 10 minutes and the compressor is switched on for this period. However, if the compressor switched off within the last three minutes, there is a three minute delay before the compressor re-starts.

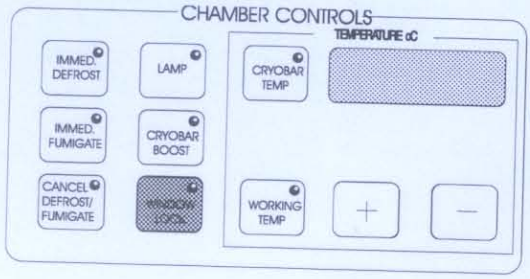
3.7.11 If **[CRYOBAR BOOST]** is pressed while its indicator is flashing at the end of the boost period, boost is repeated for a further 10 minutes. Normal operation follows when a boost period times out.



3.7.9

3.7.10





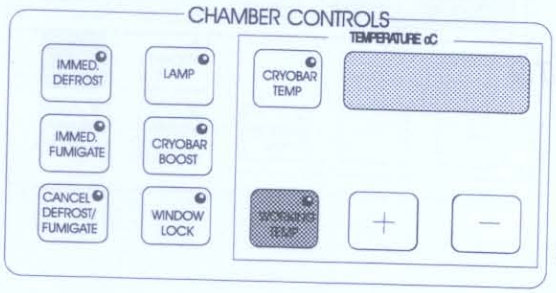
3.7.12

3.7.12 **[WINDOW LOCK]** activates an interlock that secures the window in the closed position. The window must be fully closed before the lock can operate. A second press releases the lock. If the window is not properly closed when the push-button is pressed, Err 4 is displayed. The lock remains in the locked state during power off.

3.8 TEMPERATURE CONTROLS

3.8.1 Two illuminating push-buttons in the **TEMPERATURE°C** panel facilitate monitoring of component temperatures in the Refrigerated Chamber. They also operate in conjunction with non-illuminating push-buttons **[+]** and **[-]** to set temperatures.

3.8.2 Monitoring is effected by pressing and releasing **[CRYOBAR TEMP]** or **[WORKING TEMP]** as appropriate. The display then shows the actual temperature of that component in °C. A lit push-button shows the selection to which the display refers.



3.8.3

3.8.3 3.9.3 To set the working temperature, press **[WORKING TEMP]** while using the **[+]** and **[-]** push-buttons to raise or lower the value of the number in the display. Press and hold until the desired temperature is displayed, then release both push-buttons.

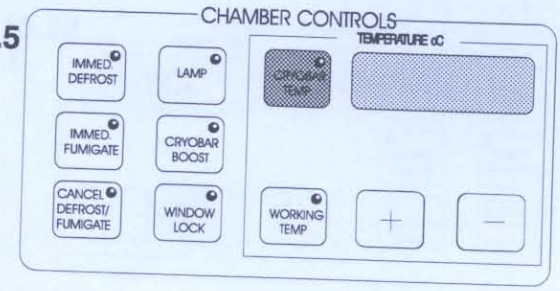
Note

1 *It is not possible to set the temperature of the Cryobar. The Cryobar is situated on the refrigeration pipework and its temperature can vary considerably.*

3.8.4 The temperature in the Refrigerated Chamber (working temperature) is automatically controlled to within 1°C of the set temperature. If no temperature is set, or after a reset, the working temperature automatically defaults to -20°C, or the last programmed temperature.

3.8.5 **[CRYOBAR TEMP]** displays the surface temperature of the Cryobar. However, if **[CRYOBAR BOOST]** is lit on the adjacent panel, the display shows the approximate temperature of the small rectangular peltier element in the Cryobar.

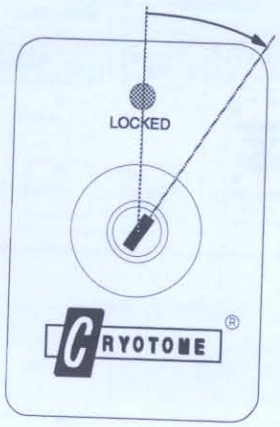
3.8.5



3.9 KEYSWITCH CONTROL

3.9.1 Access to the Control panel is enabled from a two-position keyswitch. The Control Panel is disabled when the key is vertical (off) and the **LOCKED** indicator is lit. The key is removable when vertical.

3.9.1



3.9.2 To enable the Control Panel, insert the key and turn it clockwise. The **LOCKED** indicator is not lit when the Control Panel is enabled, and the key is held in the switch.

3.10 MESSAGE CODES

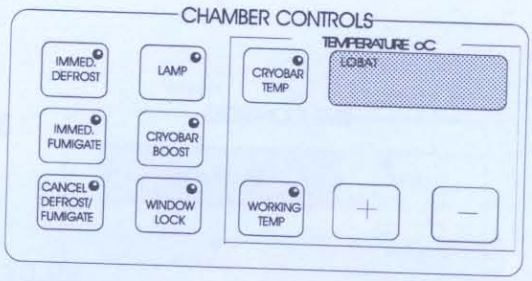
3.10.1 The following displays show in the **TEMPERATURE°C** display when conditions are appropriate.

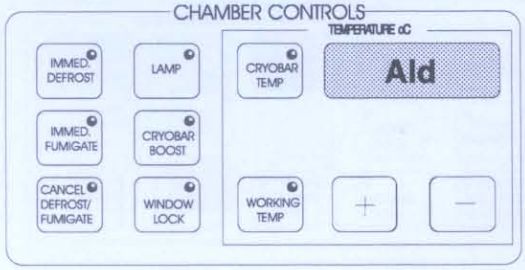
i **LOBAT** shows when the internal back-up battery is not charged sufficiently to retain information during an interruption of the mains supply.

The battery retains programmed information in memory while the power is switched off. Stored information is lost if it is allowed to discharge.

Switch power on to recharge the battery. If LOBAT still shows after power is restored for more than 12 hours, contact your Shandon dealer for service.

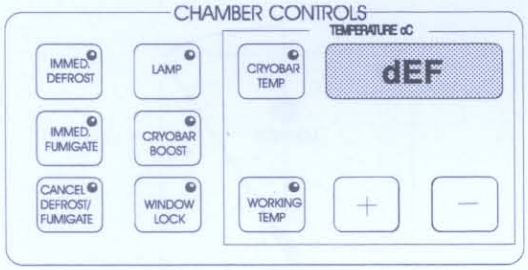
3.10.1 i





3.10.1 ii

ii **AId** shows when fumigation is in progress.



3.10.1iii

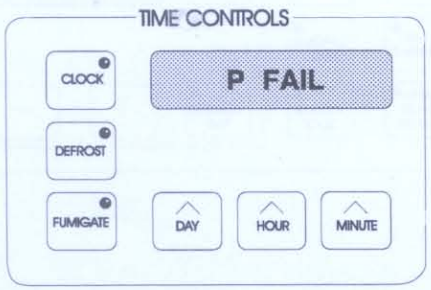
iii **dEF** shows when defrosting is in progress.

iv **---** shows if the associated temperature probe is faulty.

v **Fault Codes** show in the TEMPERATURE°C display if the instrument malfunctions. Press **[WORKING TEMP]** or **[CRYOBAR TEMP]** to over-ride most faults. Faults F:11, F:12 and F:13, cause the instrument to wait for 30 mins then reset and attempt to reach its default temperature of -20°C.

Note

1 If the fault fails to clear, contact your Shandon Dealer for service.



3.10.2

3.10.2 Indications that show in the **TIME CONTROLS** display are as follows:

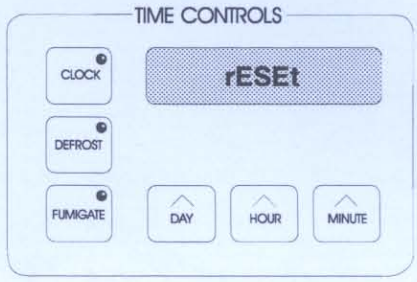
i **P FAIL** (flashing) shows after a normal switch OFF then ON, or if power failed and recovered. The TEMPERATURE °C panel shows the temperature of the Refrigerated Chamber at the time power was restored.

Press **[CLOCK]** to clear.

ii **rESEt** (flashing) shows if a problem caused the instrument to reset and clear its memory to its default status. The number in TEMPERATURE °C is the temperature of the Refrigerated Chamber at the time normal operation resumed.

Press **[CLOCK]** to clear.

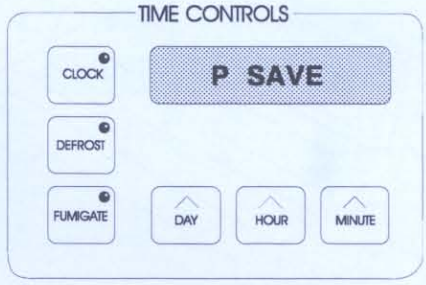
3.10.2ii



iii **P SAVE** shows until the programmed time if the instrument is in STANDBY (PSAVE) mode following the selection of a DAY 9 Defrost or Fumigate function.

Press **[CANCEL DEFROST/FUMIGATE]** to over ride.

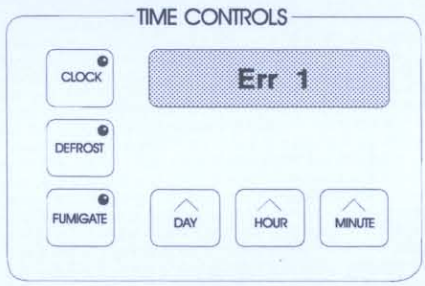
3.10.2iii



iv **Err 1** denotes an invalid push-button entry, or if too many push-buttons are pressed simultaneously.

Press **[CLOCK]** to clear.

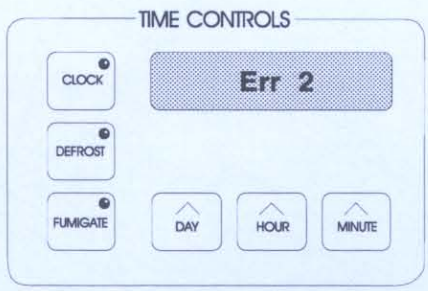
3.10.2iv



v **Err 2** denotes an invalid push-button entry during Defrost/Fumigate, or if Defrost is inhibited because the Cryobar and Refrigerated Chamber are too warm

Press **[CLOCK]** to clear.

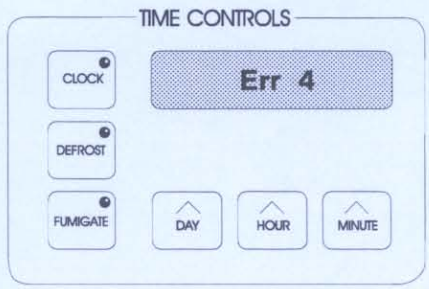
3.10.2v



vi **Err 4** denotes a window lock error (not locking or unlocking).

Press **[CLOCK]** to clear.

3.10.2v



SETTING UP

4.1 INTRODUCTION

4.1.1 Setting up the Cryotome® for routine operation involves the installation and adjustment of one or more of the following components of the microtome.

i Knife Holders

ii Knife Guards.

iv Standard solid Knife.

v Cutting Angle.

vi Disposable Blades.

vii Disposable Blade cutting angle.

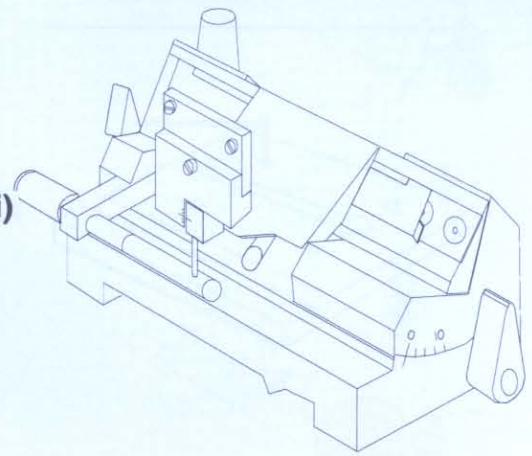
viii Anti Roll Plate angle.

ix Anti-Roll Plate parallelism.

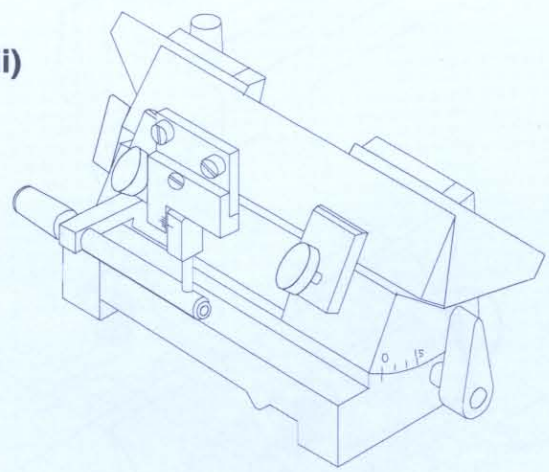
x Anti-Roll Plate gap.

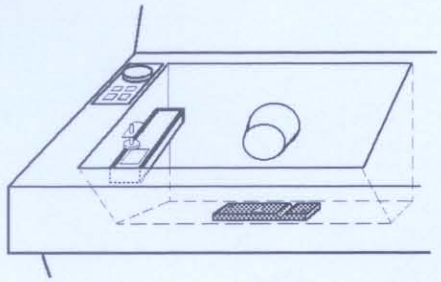
xi Anti Roll Plate height.

4.1.1(i)



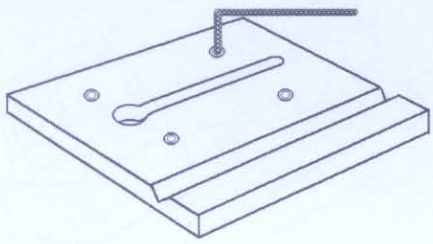
4.1.1(ii)





4.1.2

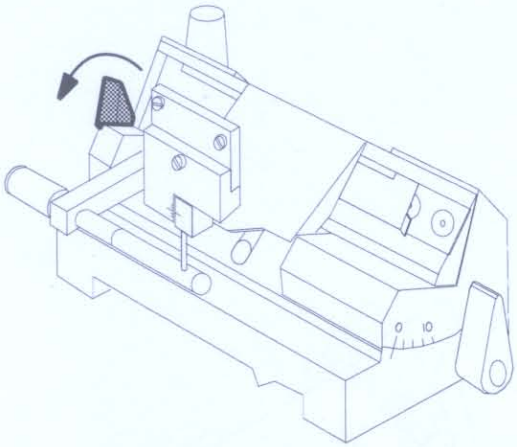
4.1.2 Both the Standard solid Knife and Disposable Blade Knife Holders fit on a common Carrier attached to the floor of the Refrigerated Chamber.



4.1.3

4.1.3 This Carrier is secured with four Allen screws which must be kept tight to prevent any movement of the Knife or Blade during cutting.

WARNING **Do not undo or remove the Allen screws or the whole of the Microtome assembly will fall and cause considerable damage.**

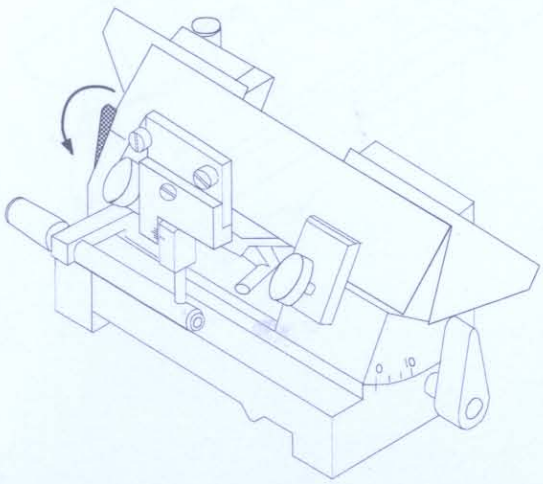


4.1.4 A cam operated screw in the bottom of the knife base engages with a locating slot in the carrier. Pulling the pivoting lever toward you releases the assembly and enables it to be slid forward or backward on the Carrier. The setting determines the distance between the Knife Holder and the Specimen Head of the microtome.

4.2 TO FIT A KNIFE HOLDER

4.2.1.i

4.2.1.ii

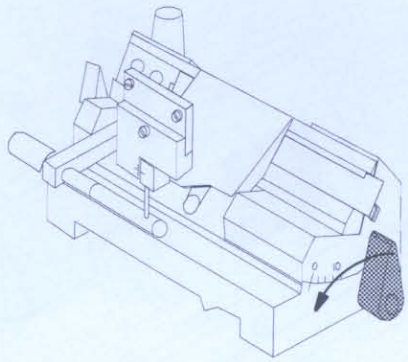


4.2.1 To fit a knife holder on the carrier for i) DISPOSABLE blades , or ii) a STANDARD SOLID KNIFE , first pull the lefthand pivoting lever of the knife holder fully toward you.

4.2.2 Engage the sprung dowel at the bottom of the knife holder into the circular aperture in the locating slot of the carrier. Push the bottom of the knife holder away from you, then lock in position by pushing the lefthand pivoting lever away from you.

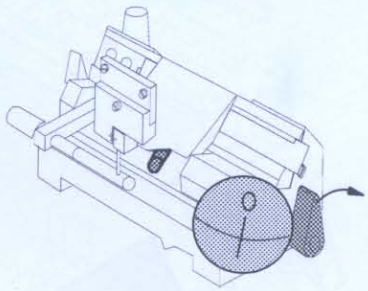
4.2.3 Pull the righthand pivoting lever of the knife holder fully toward you.

4.2.3



4.2.4 Adjust the tilt of the knife holder until the ' 0' of the tilt scale is approximately in line with the marker on the knife base, then push the righthand lever away from you to lock.

4.2.4



Note

i The knife holder is adjusted to its precise operating angle later, after the blade or knife is installed

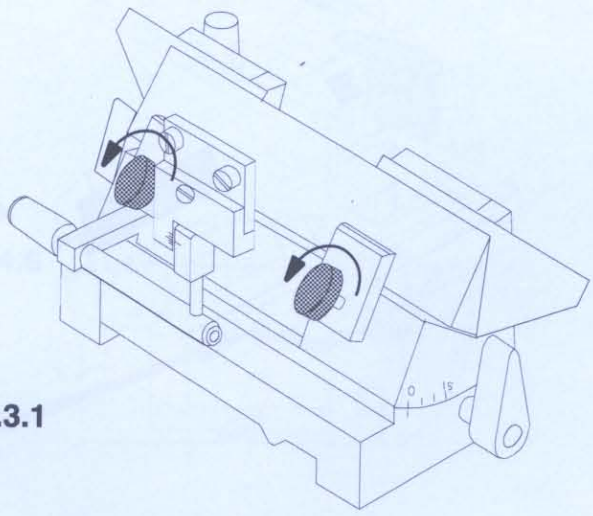
4.3 TO FIT A STANDARD SOLID KNIFE

THE KNIFE IS SUBSTANTIAL, EXTREMELY SHARP, AND COULD CAUSE SERIOUS INJURY IF MIS-HANDLED. ALWAYS WEAR MESH GLOVES WHEN HANDLING A STANDARD SOLID KNIFE

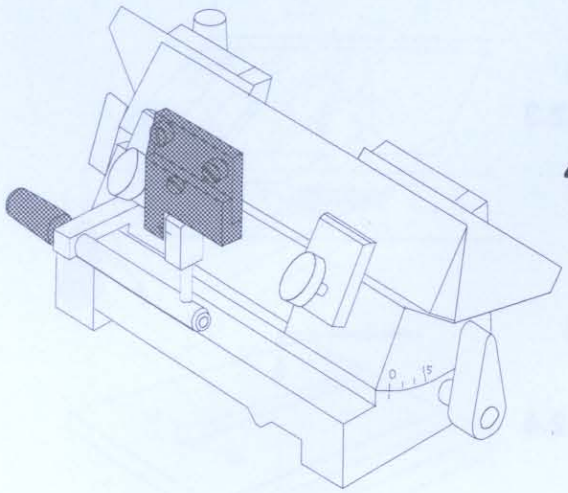
Note

1 The knife guard is specifically designed to operate with 160X34X10mm knife profiles.

4.3.1 Loosen the two clamp knobs on the standard solid knife holder by turning them counter clockwise.

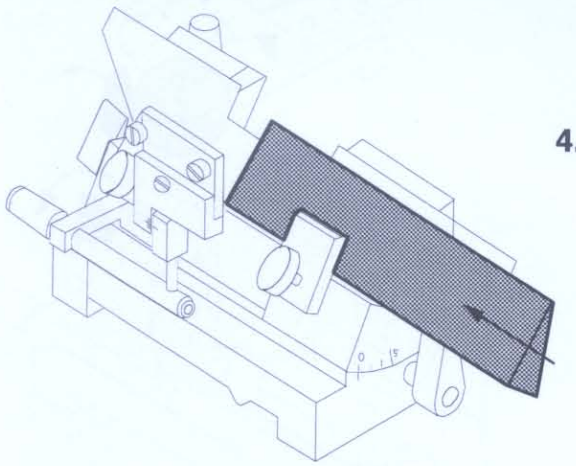


4.3.1



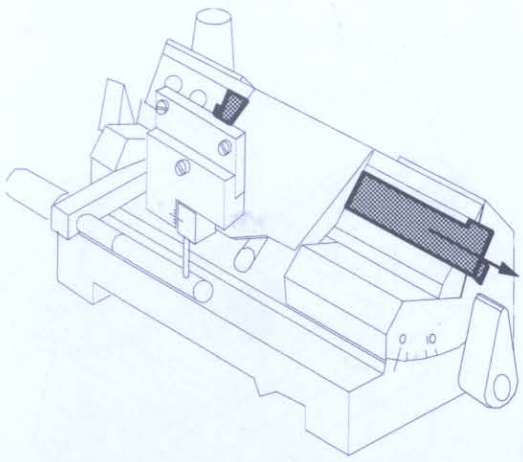
4.3.2

4.3.2 Turn the control bar of the Anti Roll Plate towards you to provide clearance for the knife between the anti roll plate and the knife guard.



4.3.3

4.3.3 Carefully slide the knife in front of the removable knife guard and place it centrally and squarely in the base of the knife holder. Tighten the clamps clockwise to secure the knife in position



4.4.1

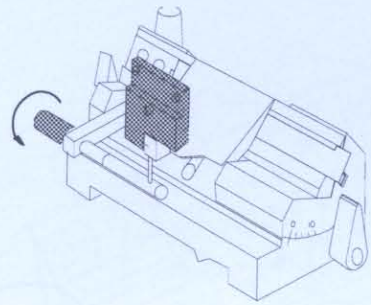
4.4 TO FIT A DISPOSABLE BLADE

4.4.1 Slide the Blade Transporter as far as possible to the right.

ALWAYS USE MESH GLOVES TO AVOID INJURY WHEN HANDLING DISPOSABLE BLADES. USE THE DISPENSER WHEN FITTING A NEW BLADE.

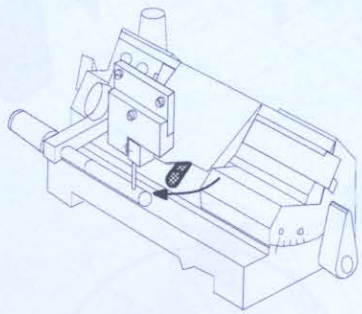
4.4.2 Swing the anti roll plate away from the blade clamp by turning the control bar toward you.

4.4.2



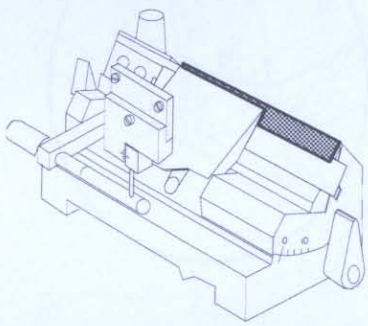
4.4.3 Move the blade clamp lever to the left (clockwise) until it is vertically down.

4.4.3



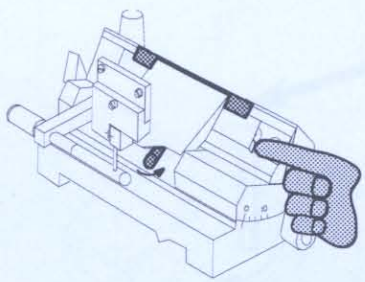
4.4.4 Push the end of the blade to be installed part way out of the dispenser and put its left end under the plate of the blade clamp. Slide the blade to the left until its right-hand end drops into the recess of the blade transporter.

4.4.4



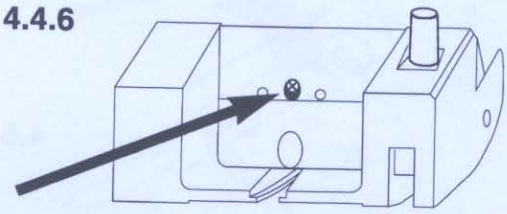
4.4.5 Use the transporter to move the blade into its first cutting position, then push the blade clamp lever to the right (counter clock-wise) to lock the blade in position.

4.4.5



4.4.6 With use it is possible that the blade clamp mechanism loosens slightly so that the blade does not clamp properly. Adjust the screw at the rear of the Knife Holder as neces-sary to obtain the required locking action.

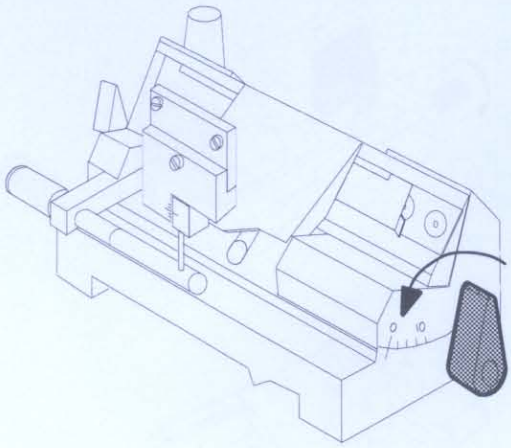
4.4.6



4.5 TO SET UP THE KNIFE HOLDER AND ANTI-ROLL PLATE FOR STANDARD SOLID AND DISPOSABLE BLADES

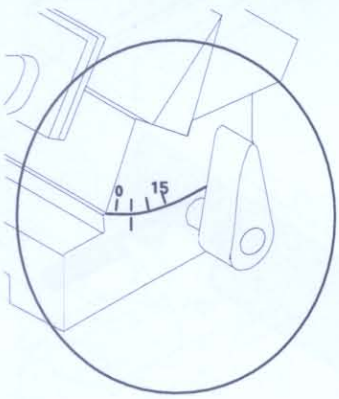
Note

1 These are the recommended settings. You may need further minor adjustments to obtain best results.



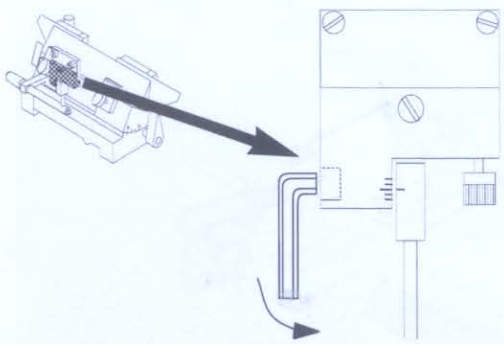
4.5.1

4.5.1 Release the tilt clamp by pulling the righthand pivoting lever of the knife holder towards you.



4.5.2

4.5.2 Set the tilt angle of the holder between 4° and 5°, then lock it at that angle by pushing the righthand lever away from you.

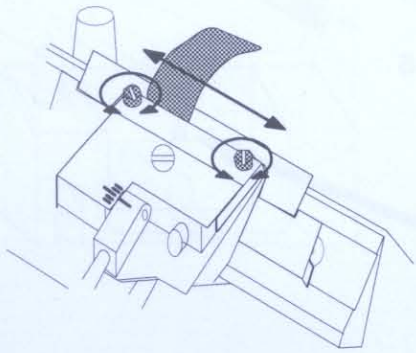


4.5.3

4.5.3 Adjust the angle of attitude of the anti roll plate by lining up the datum line with the third line of the head. Use an Allen key to slacken the head as necessary; tighten after adjustment.

Note

1 If the sections appear to curl slightly after cutting, reduce the angle of attitude slightly.

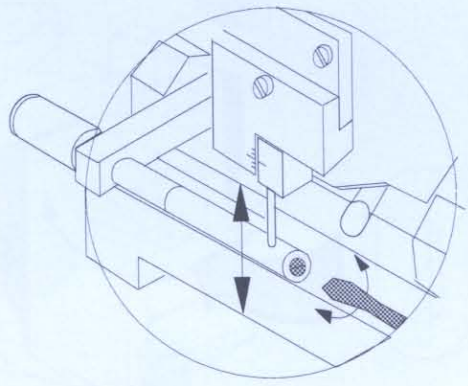


4.5.4

4.5.4 Use the two adjusting screws to set the anti-roll plate gap. Place a thin strip of paper between the knife/blade and the anti-roll plate. Check that it is **JUST** free to move - all along the gap - left to right.

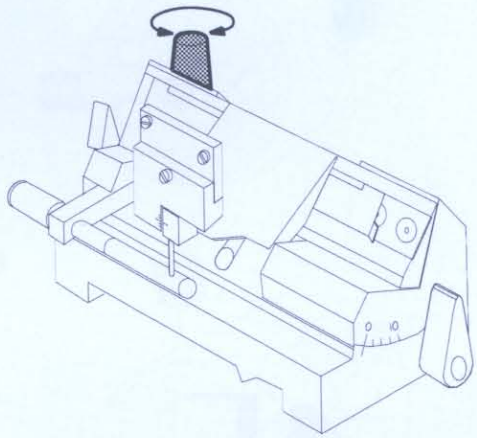
4.5.5 Use the adjusting screw on the anti roll plate support bar to set the approximate height for the anti roll plate. Loosen and tighten the Allen screw as necessary.

4.5.5



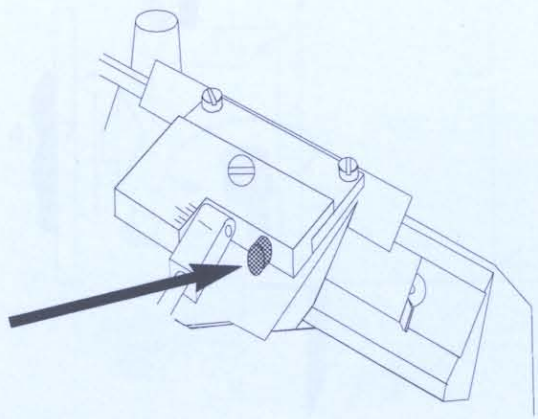
4.5.6 Use the height adjust control to set the precise height of the anti roll plate. You should **JUST** be able to see the top of the anti-roll plate above the edge of the knife/blade. Fine adjust so that the specimen **JUST** misses the anti roll plate when cutting.

4.5.6

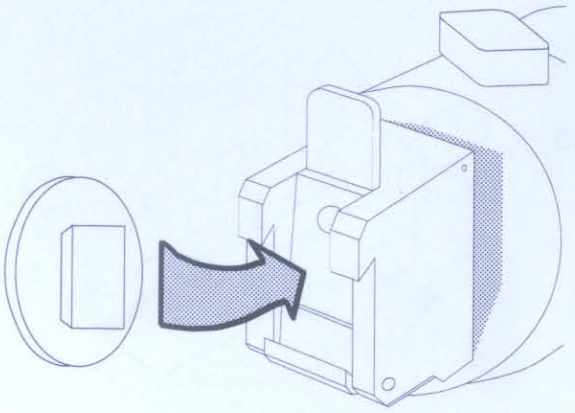


4.5.7 Use the nylon adjuster screw to rectify any slew of the anti roll plate. Make sure that the top of the anti roll plate is parallel with the top edge of the knife/blade.

4.5.7



4.5.8 Ensure that there is a good edge i.e. there are no 'nicks' - on the anti roll plate. Use the brush supplied to keep the anti roll plate, the blade, and the clamp clean.

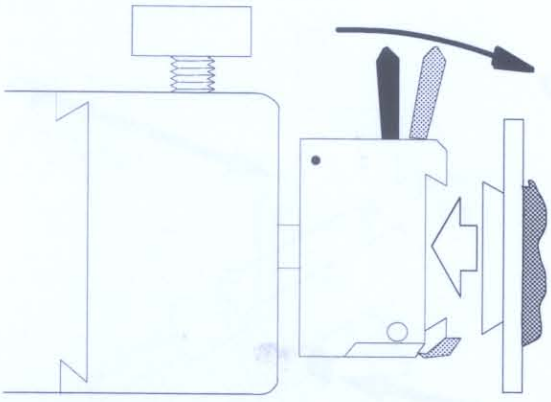


4.6.1

4.6 SPECIMEN HEAD CONTROLS

4.6.1 The **CRYOCASSETTE CLAMP** is designed for square backed Cryocassettes on which the specimen is already mounted by means of freezing. Shandon CRYOMATRIX™ or CRYOCHROME™ Frozen Specimen Embedding medium assists in maintaining a good bond between the specimen and the Cryocassette.

4.6.2 The frozen specimen on the Cryocassette is held in the Specimen Head by a Cryocassette Clamp. The upper jaws of the clamp are fixed. The bottom jaw is attached to the Clamp lever at the top of the assembly. A spring acts on the Clamp lever to provide a pressure that retains the Cryocassette firmly in position.



4.6.3

4.6.3 To install a Cryocassette in the Cryocassette Clamp:

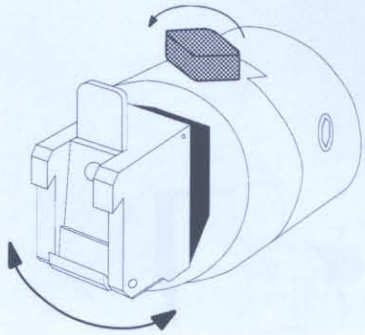
i Pull the spring-return Clamp lever toward you.

ii Fit the cryocassette under the fixed jaws.

iii Release the Clamp lever.

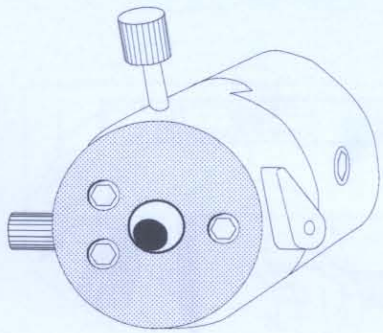
4.6.4 To orientate the Specimen to cut the best sections, loosen the knob on top of the Specimen Head by turning it anti-clockwise. The Cryocassette Clamp may then rotate 360° in the cutting plane. Tighten the knob when the optimum angle is obtained.

4.6.4



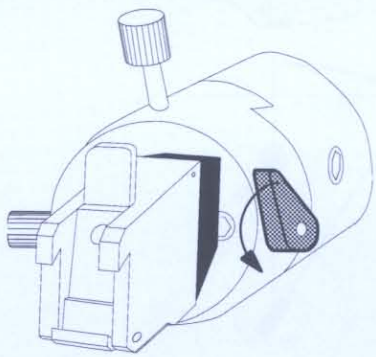
4.6.5 Full orientation of the specimen is possible when a **FINE ADJUST ORIENTATING HEAD** (0620-006) is specified. This allows 360° rotation, as before, plus fine adjustment in the X-Y planes.

4.6.5



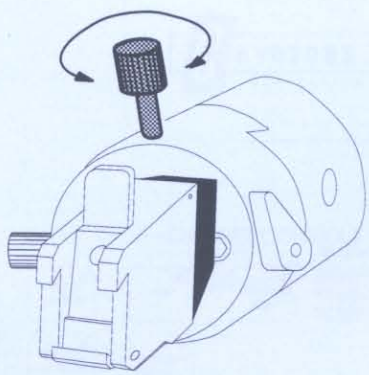
4.6.6 The lever on the righthand side of the Fine Adjust Orientating Head pulls forward to release the Cryocassette Clamp.

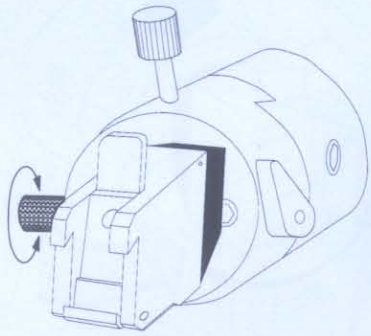
4.6.6



4.6.7 The knurled rotary control at the top of the Specimen Head sets the vertical orientation of the specimen. Clockwise rotation tilts the specimen upward; counter-clockwise rotation tilts the specimen downward.

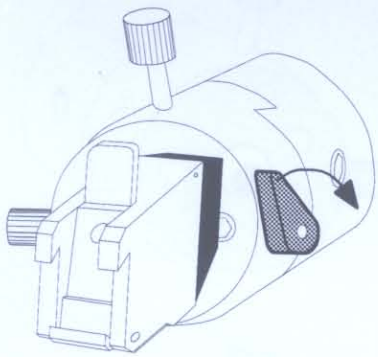
4.6.7





4.6.8

4.6.8 The knurled rotary control at the lefthand side of the Specimen Head sets the horizontal orientation of the specimen. Clockwise rotation tilts the specimen to the left; counter-clockwise rotation tilts the speciment to the right.



4.6.9

4.6.9 Push the lock lever away from you (clockwise) to clamp the Specimen Head in the set position.

Note

1 *A SIMPLE ADJUST orientating head with clamp lever and joystick control is also available.*

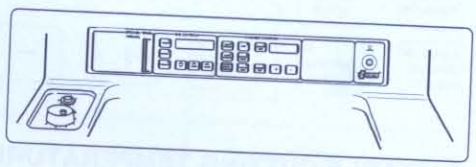
OPERATION

5.1 INTRODUCTION

5.1.1 When not in use, the instrument is normally kept switched on with the sliding window locked closed and the Refrigerated Chamber at approximately -15°C to -20°C.

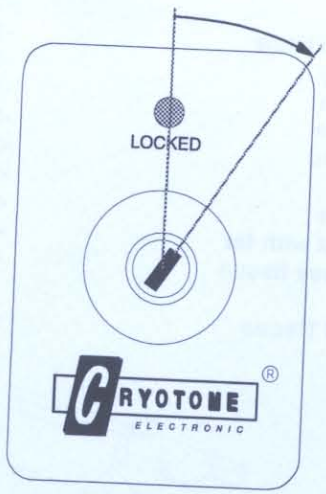
5.1.2 The Control Panel is disabled, and the instrument is inoperable, when the keyswitch is vertical. The yellow **LOCKED** indicator is lit when the Control Panel is disabled and the key can be removed to keep the instrument locked.

5.1.2



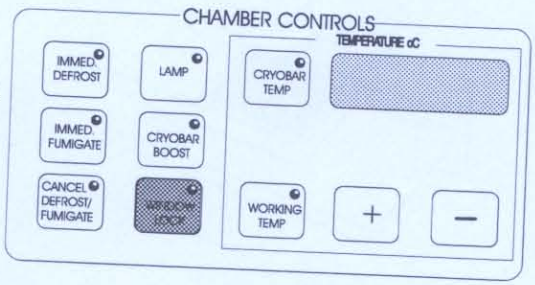
5.1.3 Insert the key in the keyswitch and turn it clockwise to unlock the Control Panel. The **LOCKED** indicator is not lit when the Control Panel is enabled, and the key cannot be removed.

5.1.3

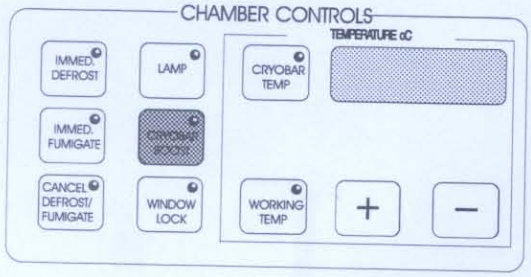


5.1.4 If **[WINDOW LOCK]** is lit, press the **[WINDOW LOCK]** push-button once to release the window and extinguish the indicator.

5.1.4

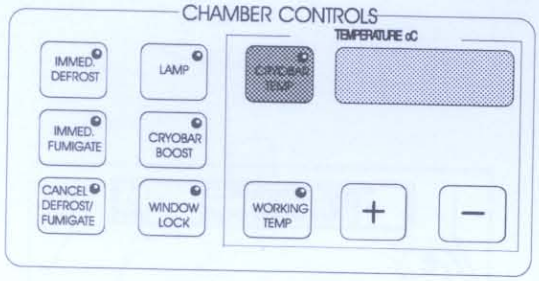


5.2 MOUNTING A SPECIMEN



5.2.1

5.2.1 Lower the heat sink on to the Cryobar and then press and release **[CRYOBAR BOOST].**



5.2.2

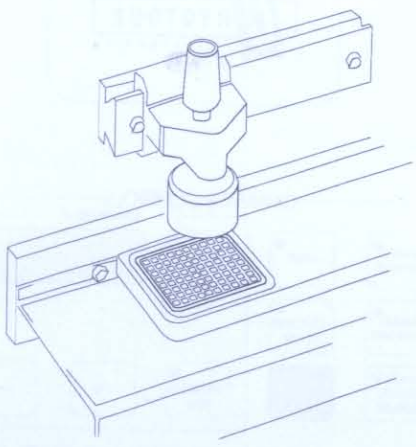
5.2.2 Wait for a few minutes then press **[CRYOBAR TEMP]** to check that the temperature of the peltier element in the Cryobar is between -50°C and -60°C i.e. approximately 20°C below the normal Cryobar temperature,

SUITABLE CUTTING TEMPERATURES FOR UNFIXED FROZEN TISSUES.

TISSUE TYPE	WORKING TEMP.(°C)
Brain	-12
Liver	-14
Lymph Node	-14
Kidney	-16
Spleen	-16
Muscle	-20
Thyroid	-20
Skin	-25
Breast	-25
Breast with fat	-30 or below
Adipose tissue	-30 or below
Fixed Tissue	-12 to -17

5.2.3

5.2.3 Use the guide to select the optimum temperature for the specimen to be cut then keep **[WORKING TEMP]** pressed while using the **[+]** or **[−]** push-buttons to set the required temperature.



5.2.4

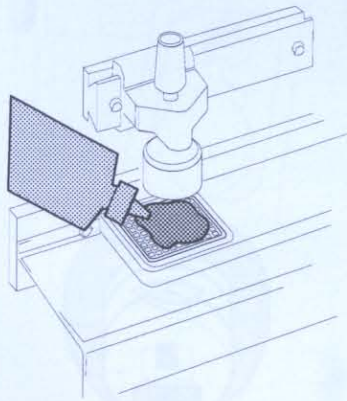
5.2.4 Get a clean Cryocassette that has been held at room temperature. Apply a layer of frozen specimen embedding medium, such as *CRYOMATRIX™ or CRYOCHROME™, to the grooved side of the Cryocassette, then lift the heat sink sufficiently to allow you to place the Cryocassette in the Peltier platform of the Cryobar.

*CRYOMATRIX™ and CRYOCHROME™ are proprietary Shandon consumables.

5.2.5 When the mountant starts to freeze, place the specimen directly from the cutting-up board on to the mountant and press down lightly to eliminate any entrapped air.

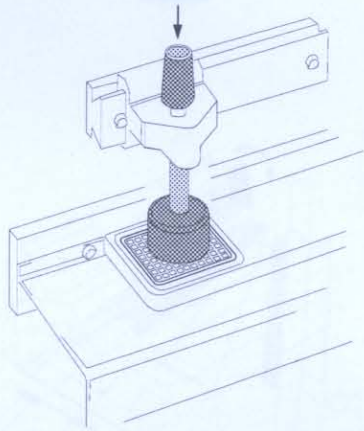
5.2.6 Add a final coat of mountant and allow it to freeze.

5.2.6



5.2.7 Lower the heat sink gently onto the specimen. Allow the specimen and mountant to freeze until both are opaque and firm. Take care not to touch the specimen.

5.2.7



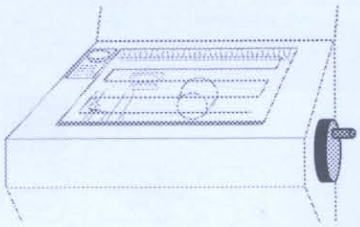
Notes

1 *Do not use too much mountant, or get it onto the sides or back of the Cryocassette.*

2 *Normal compressor operation resumes 10 minutes after cryobar boost is initially enabled. During this period, you may:*

   i *manually switch off the cryobar boost facility by pressing* ***[CRYOBAR BOOST]****.*

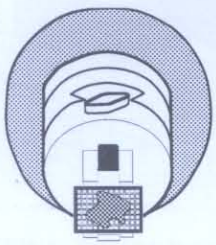
   ii *Enable Cryobar Boost for a further 10 minutes by pressing* ***[CRYOBAR BOOST]*** *while the Cryocar Boost LED is flashing.*



5.2.8

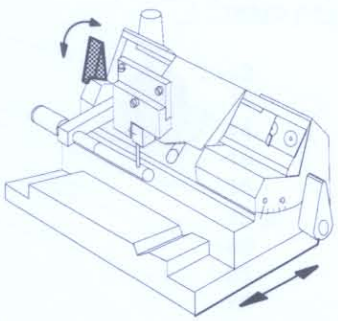
5.2.8 Turn the handle of the flywheel to the 12 o'clock position, and apply the brake.

5.2.9



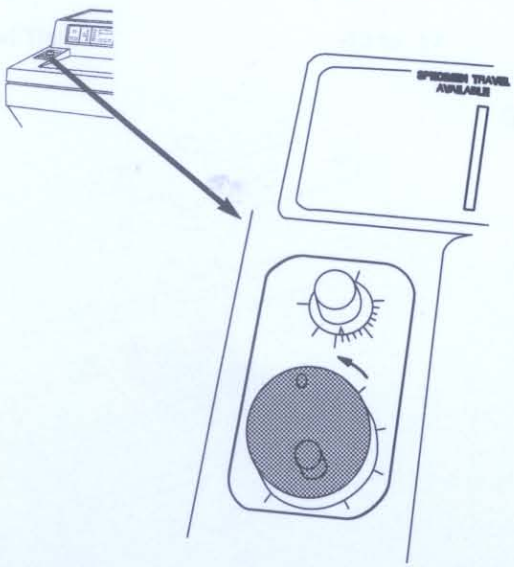
5.2.9 Transfer the Cryocassette, complete with frozen specimen, from the Cryobar to the Specimen Head and secure it in position with the CRYOCASSETTE CLAMP (see 4.6).

5.3 TO SET THE KNIFE HOLDER FOR CUTTING SPECIMEN



5.3.1

5.3.1 Turn the flywheel to 3 o'clock and lock it in position. Pull the pivoting lever at the left-hand side of the knife holder towards you then carefully push the base of the knife holder along the carriage away from you until the blade is almost touching the specimen. Lock the knife holder in position by pushing the pivoting lever away from you.



5.3.2

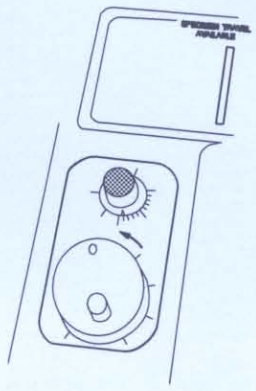
5.3.2 Alternatively, if sufficient 'Travel Available' is indicated on the **SPECIMEN TRAVEL INDICATOR**, advance the specimen towards the knife using the REWIND/ADVANCE knob of the Minor Control Panel.

5.4 TO CUT SECTIONS

KEEP THE WINDOW CLOSED WHEN CUTTING OR INJURIOUS AEROSOLS MAY BE INHALED.

5.4.1 At the Minor Control Panel use the small diameter **MICRON SELECTOR** knob to set the required section thickness.

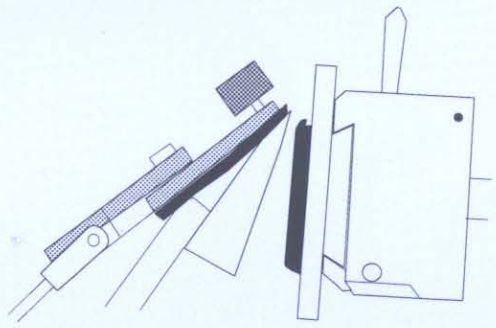
5.4.1



5.4.2 Turn the Flywheel smoothly. The instrument performs a single cutting stroke with each full revolution of the Flywheel, and cuts a section of the specimen. Check to make sure that the section is flat before removing it onto a slide.

5.4.3 If necessary, adjust the Anti Roll Plate to ensure that each section is taken cleanly and is un-curled.

5.4.3



5.4.4 Continue to rotate the Flywhell if additional sections are required. The Specimen advances automatically by the set distance before the start of each cutting stroke.

5.5 TO REMOVE THE SPECIMEN

5.5.1 When the last section is cut, lock the Flywheel at the 3 o'clock position. Remove the cryocassette from the clamp. If the specimen is to be stored frozen, wrap it in metal foil before putting it into a freezer. **Do not store it in the Refrigerated Chamber of the Cryotome.**

5.5.2 If the specimen is to be fixed, allow it to thaw before placing it in a suitable fixative; otherwise discard it by the usual method for unfixed tissue. Brush away any debris that has collected on the Specimen Head.

5.5.3 Decontaminate and clean the Cryocassette.

5.6 HOUSEKEEPING

5.6.1 **Daily** decontaminate the specimen brush by putting it overnight in a solution of 10% Formalin; 2% Glutaraldehyde. Wash and dry the brush each morning before use.

5.6.2 **Daily after Fumigation** carefully remove the debris tray, Knife Holder and any debris. Wash in running hot water initially to remove the debris, then immerse overnight in a solution of 10% Formalin; 2% Glutaraldehyde. The following day, wash, dry, and replace in the Cryotome®

5.6.3 Wash the Refrigerated Chamber with alcohol or warm soapy water to remove debris, and rinse with a solution of 10% Formalin down the outlet tubes in the bottom of the chamber, and beneath the fins of the heat exchanger.

DECONTAMINATION CLEANING, AND MAINTENANCE

6.1 INTRODUCTION

6.1.1 It is important that decontamination and cleaning of the instrument becomes an automatic routine - especially if the source of material is unknown. It is recommended that a log is kept which lists:

i Material Cut.

ii Degree of Risk.

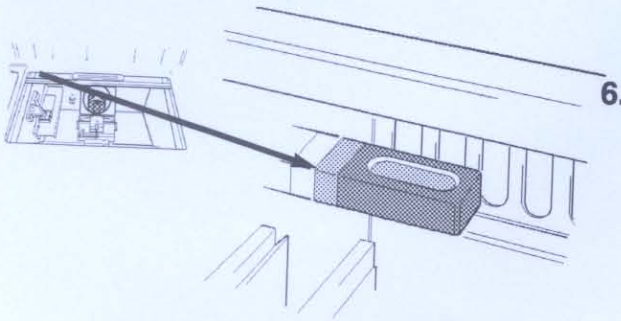
iii Decontamination Performed.

iv Name of User.

v Department.

6.1.2 Cleaning is very much a part of good laboratory housekeeping practice. External cleaning requirements are straightforward. The Refrigerated Chamber should only be washed and cleaned after the Chamber is thoroughly decontaminated by fumigation.

6.1.3 Routine maintenance by the Operator does not require the removal of any panels or fixtures. Precision maintenance and adjustment should only be performed by Shandon trained Service personnel and it is recommended that a Maintenance Contract is obtained from our Service Department.

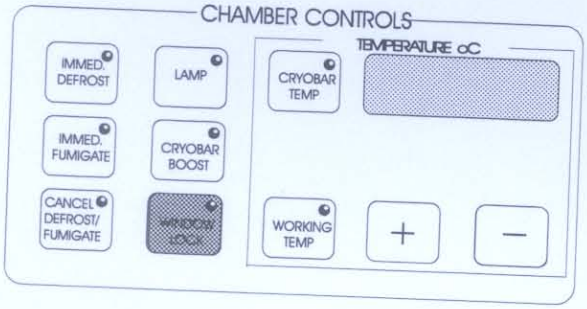


6.2.1

6.2 FUMIGATION

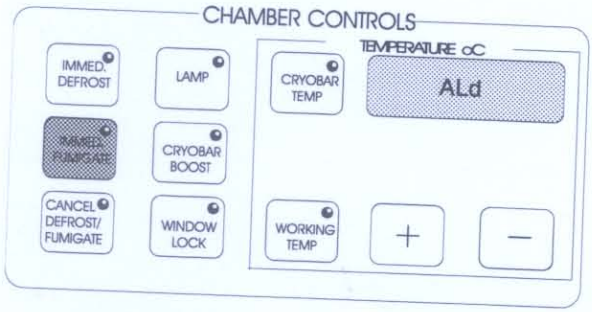
6.2.1 Carefully load the heating trough in the Refrigerated Chamber with 2 ml of concentrated formalin solution.

6.2.2 Close the window.



6.2.3

6.2.3 Press **[WINDOW LOCK]** and check that the push-button indicator is lit.



6.2.4

6.2.4 Press **[IMMED FUMIGATE]** in the CHAMBER CONTROLS panel.

6.2.5 Fumigation takes place at the same time every day if the DAY 8 option is selected in the FUMIGATION program. Before the scheduled time for fumigation each day it is therefore essential that:

i 2 ml of concentrated formalin is in the heater trough;

ii the window is shut and locked;

iii the key is removed from the Control Panel.

6.2.6 If DAY 9 is set in the fumigation program, the instrument goes into 'Standby Mode' (PSAVE) after fumigation is completed. Therefore, if a DAY 9 option is selected in the fumigation program, insert a beaker containing 10 ml of Ammonia SG880 in the Refrigeration Chamber to absorb residual formaldehyde from the atmosphere in the Chamber. Keep the chamber closed while allowing the beaker to stand for an hour.

6.3 CLEANING

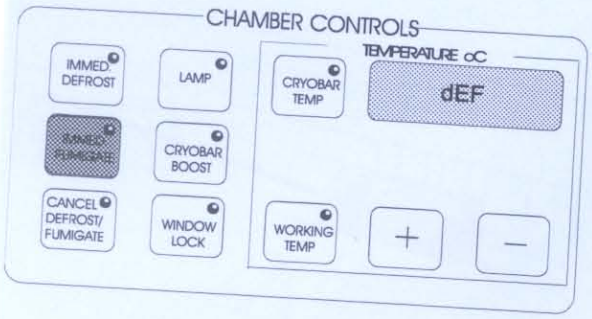
6.3.1 Use a proprietary spray foam cleanser, or a cloth damped in soapy water, and a dry polishing cloth to periodically clean the outside of the cabinet. DO NOT USE EXCESSIVE WATER.

6.3.2 Periodically wash the Refrigerated Chamber with alcohol or warm soapy water to remove debris. Rinse well with a solution of 10% Formalin. Wash the Formalin solution down the outlet tubes in the bottom of the chamber, and beneath the fins of the heat exchanger.

6.3.3 Wipe and dry the walls of the Refrigerated Chamber carefully using a chamois leather damped with the cleaning solution followed by a dry polishing cloth.

6.3.4 The high polish finish inside the Refrigerated Chamber is designed to minimise the adhesion of particles to the sidewalls.

WARNING **DO NOT USE SCOURING POWDER OR HARSH DETERGENTS OR YOU WILL DEGRADE THE POLISHED FINISH.**

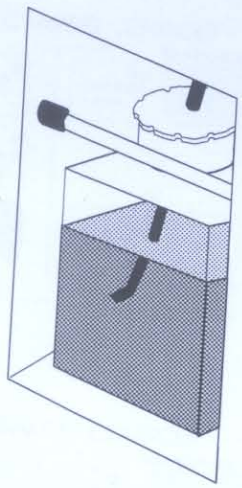


6.4.1

6.4 DEFROSTING

6.4.1 The accumulation of frost within the Refrigerated Chamber reduces the efficiency of the refrigeration system. Press **[IMMED DEFROST]** if the cooling coils are frosted up, or if the performance of the refrigeration unit deteriorates.

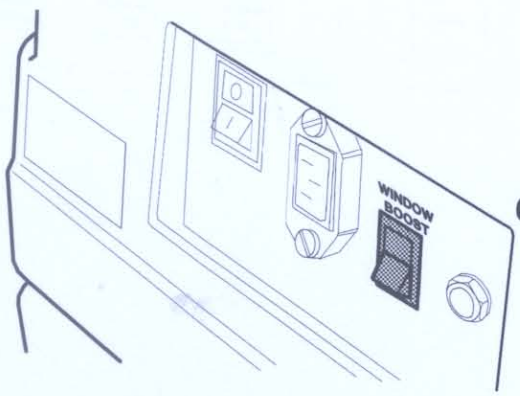
6.4.2 Alternatively, use the DAY 8 setting of the timer to defrost for 15 minutes at a regular time each day. The temperature of the Refrigerated Chamber will not normally rise above 0ºC.



6.4.3

6.4.3 The waste bottle collects water from the cooling coils of the heat exchanger. It also collects debris when the Refrigerated Chamber is washed down.

<u>ALWAYS</u> KEEP AT LEAST 200ml OF 10% FORMALIN SOLUTION OR SIMILAR DE-CONTAMINANT IN THE WASTE BOTTLE. MAKE SURE THAT THE END OF THE DRAIN TUBE IS KEPT SUBMERGED.



6.4.4

6.4.4 If condensation appears on the window in conditions of high relative humidity, set the **WINDOW BOOST** switch at the rear of the instrument to '**ON**' .

Note

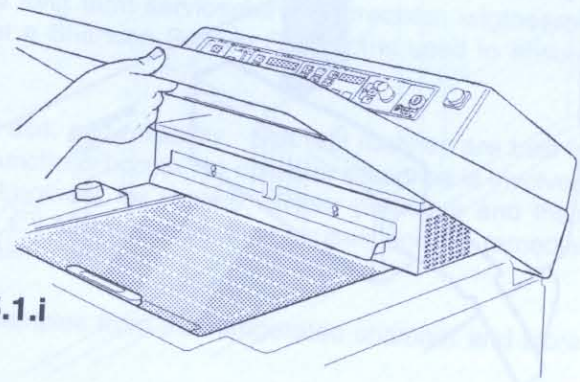
1 *The refrigeration system operates less efficiently if the window boost facility is left switched on unnecessarily*

6.5 MAINTENANCE

SWITCH OFF THE INSTRUMENT AT THE MAINS AND REMOVE THE PLUG FROM THE WALL SOCKET BEFORE PROCEEDING WITH ANY MAINTENANCE.

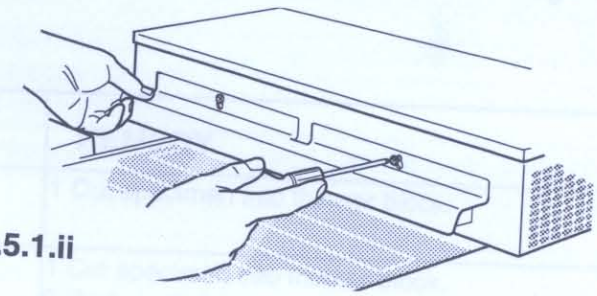
6.5.1. TO REMOVE THE LAMP TUBE

i Lift off the top cover,



6.5.1.i

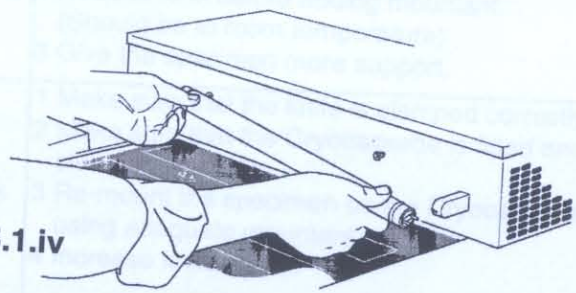
ii Loosen the two screws that hold the shade.



6.5.1.ii

iii Slide the shade along its two keyhole slots, then lift it off.

iv Grip the fluourescent tube firmly, rotate it 90°, and pull it towards you to slide it from the end connector.



6.5.1.iv

6.5.2 TO FIT A LAMP TUBE

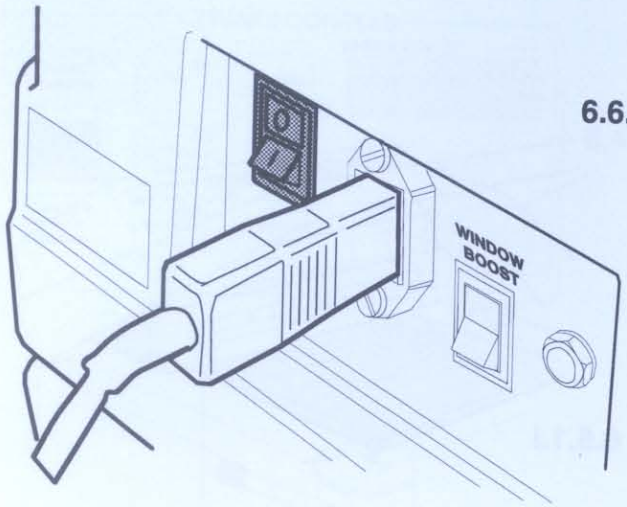
i Hold the replacement tube firmly at the ends and align the connector pins with the slots at each end of the fitting.

ii Carefully push the tube into place.

iii Rotate the tube a quarter turn.

iv Fit the shade into its two keyhole slots and push it into position.

v Tighten the two screws that hold the shade, and replace the cover.



6.6.1

6.6 ELECTRICAL PROTECTION

6.6.1 The mains input supply feeds the Cryostat via a trip device that interrupts the electrical supply to the instrument if an internal fault occurs. The trip replaces the function of a fuse.

6.6.2 When the electrical protection device trips, the mains switch goes to its **O** position (OFF) and the instrument becomes inoperative.

6.6.3 if the protection circuit operates, check that all motor driven components are free to move correctly, and that no debris or equipment is blocking movement. Also, check that no liquids have been spilt around the area of the Refrigerated Chamber or Control Panel before attempting to reset the trip circuit.

6.6.4 Press and release the **I** side of the mains ON/OFF switch to switch the instrument on again. If the protection circuit keeps tripping the switch, contact your Shandon Service representative.

WARNING **ELECTRICAL PROTECTION IS INCLUDED TO PROTECT THE OPERATOR AND THE INSTRUMENT. DO NOT ATTEMPT TO OVERRIDE THE PROTECTION TRIP BY ARTIFICIAL MEANS SUCH AS JAMMING OR BY USE OF ADHESIVE TAPE.**

TROUBLE SHOOTING

7.1 Correct service and maintenance is essential for the long term serviceability of precision engineered products such as Cryotome®. We strongly recommend that a Shandon Service Contract is used to ensure future reliability, and consistency of performance.

7.2 Cryotome® is designed for maximum safety, ease of use, and reliability. Self test routines are built in so that fault codes (**F:(Number)**) show in the displays if malfunctions occur. No operator response is involved following a fault code other than to contact your Shandon Engineer for service. Other problems and their causes, that are not shown in the displays, are listed in Table 1. Alarm signals, their causes, and the remedial action to be taken are listed in Table 2.

7.3 If a fault indication continues or recurs, remove the samples from the refrigerated chamber and store them in a suitable refrigerated container.

TABLE 1 - PROBLEMS WHEN SECTIONING

SYMPTOM	CAUSE	REMEDY
Specimen cracks as it is frozen.	1 Too rapid freezing. 2 Specimen too thick.	1 Cut specimen into thinner block.
Specimen falls off Cryocassette.	1 Specimen too thick. 2 Cryocassette too cold before mountant added. 3 Specimen unsupported.	1 Cut specimen into thinner block. 2 Reduce time before adding mountant. (Should be at room temperature) 3 Give the specimen more support.
Specimen advances but does not cut.	1 Knife loose. 2 Cryocassette loose. 3 Specimen not firmly stuck to the Cryocassette. 4 Knife angle incorrect.	1 Make sure that the knife is clamped correctly 2 Make sure that the Cryocassette is fitted and clamped correctly. 3 Re-mount the specimen on the Cryocassette using adequate mountant. 4 Increase knife angle.
Sections roll-up.	1 Incorrect gap between Anti Roll Plate and knife. 2 Anti Roll Plate too low. 3 Incorrect Anti Roll Plate angle.	1 Adjust Anti Roll Plate gap. 2 Raise the height of the Anti Roll Plate. 3 Adjust the angle between the Anti Roll Plate and the knife.
Sections thaw when cut.	1 Cutting equipment not cold enough.	1 Allow more time for the knife and the Anti Roll Plate to cool.

TABLE 1 - CONTINUATION - PROBLEMS WHEN SECTIONING

SYMPTOM	CAUSE	REMEDY
Sections are puckered.	1 The knife is dirty. 2 The knife is damaged. 3 The Anti Roll Plate is nicked.	1 Remove and clean the knife. 2 Check and, if necessary.sharpen the knife. 3 Inspect and, if necessary, replace the Anti Roll Plate.
Sections are incomplete in width.	1 The Anti Roll Plate is not adjusted correctly.	1 Adjust the slew angle of the Anti Roll Plate.
Sections appear with fine cracks parallel to the edge of the knife.	1 Specimen is too cold when cut.	1 Usually applies to fixed tissue. Soak in Dextran before freezing.
Sections show ice artifacts.	1 Specimen not frozen quickly enough. 2 Specimen too thick.	1 Allow Cryoboost longer time before adding mountant and admitting specimen. 2 Cut thinner.
Sections show signs of the effects of vibration.	1 Knife not supported correctly. 2 Knife angle incorrect. 3 Specimen not sufficiently secured.	1 Disposable knives are most vulnerable. Make sure that the knife is fitted correctly and that there is no debris under the knife clamp. 2 Check and correct the knife angle. 3 Re-freeze as necessary.
Sections thick and thin.	1 Blunt knife 2 Knife angle too shallow. 3 Specimen not secure.	1 Sharpen knife. 2 Widen the knife angle 3 Re-freeze and secure the specimen.
Sections stick to the Anti Roll Plate.	1 Dirt or contaminant on the Anti Roll Plate. 2 Cutting equipment not cold enough.	1 Use the brush to clean the Anti Roll Plate. 2 Allow more time for the knife and the Anti Roll Plate to cool.
Sections are split vertically.	1 The knife is dirty. 2 The knife is blunt.	1& 2 Remove the knife and clean and sharpen it. WEAR MESH GLOVES.

TABLE 2 - ERROR MESSAGES

SYMPTOM	CAUSE	REMEDY
LOBAT	1 Internal back-up battery is losing charge	1 Switch on/leave the unit switched on. 2 Have the battery replaced.
Err 1	1 Invalid pushbutton entry. 2 Too many pushbuttons pressed simultaneously.	1 Use the correct pushbutton. 2 Re-enter pushbutton selections correctly.
Err 2	1 Invalid pushbutton entry.during Defrost/ Fumigate. 2 Defrost is inhibited because the Cryobar and Chamber are too warm.	1 Use the correct pushbutton, or wait for the function to end. 2 Adjust working temperature to a lower chamber temperature.
Err 3	Not allocated.	None
Err 4	1 Window lock error - cannot lock or unlock.	1 Make sure that the window is closed correctly. 2 Contact the Shandon Service Engineer.
Err 5	Not allocated.	None
Err 6	Not allocated.	None
Err 7	Not allocated.	None
Err 8	Not allocated	None

SPECIFICATION

Physical

Height(mm)	1070mm (42 1/8 ins)
Width	660mm (26 ins)
Depth	640mm (25 1/4 ins)
Weight	150Kg (330 lbs)
Mounting	4 off Movable castors - Front 2 retractable

Electrical

NOTE Voltage is set at the factory.

Power	50Hz = 1700 VA: 60Hz = 1400 VA
a.c. Voltage (V1)	220 - 240; 50 Hz
(V2)	110 - 120; 60 Hz
(V3)	220V 60 Hz
Switch convention	I = Power On
	O = Power Off

Indicators

Display Panels	2 off LCD - TIME, and TEMPERATURE
Pushbuttons	Illuminating - Yellow
	Steady State = Selected
	Flashing = Operating
	Specimen Travel Bar graph.

Controls

Mechanical	Flywheel - Cutting Head drive
	Advance/Rewind
	Micron Select knob.
Electrical	Time Controls
	Chamber Controls - Temperature control.
	- Defrost.
	- Fumigate.
	- Lamp
	- Cryobar
	- Window Lock
	Isolating keyswitch

Capacities

Waste bottle	2 litres.
Fumigation Reservoir	4 ml

Refrigeration

Conventional refrigeration system employing heat exchanger inside the refrigerated chamber.

Minimum Chamber Temperature - 30°C at 20°C ambient or lower.

Microtome

Rotary rocking microtome mounted outside refrigerated chamber.

Total specimen advance	12 mm.
Section thickness range	0 to 30 μm in increments of 1 μm.
Retraction	approx. 100 μm on upward stroke.
Specimen holder	Quick Release Cryocassette Clamp Orientation; 360° Z axis. Optional X-Y
Knife Holder	Universal with integral Anti Roll Plate assembly. Disposable Knife Holder with integral Anti Roll Plate assembly.

Chamber detail

Construction	High polish stainless steel.
Cryocassette storage shelf	
Heated fumigation reservoir	
Cryobar Temperature	min temp = -60°C with Peltier effect quick freezing device (or below with compressor running)
Cover	Sliding, heated, double glazed window.
Lighting	15w strip fluorescent.
Accessories	Storage and debris trays.

Environmental Detail

Indoor operation only

Altitude	Not exceeding 2000m.
Temperature range	10°C to 35°C
Relative Humidity	80% non condensing (max).
Pollution	Degree 2
Installation	Category II

Power Supply Detail

Nominal Voltage	Frequency Hz	Tolerated Voltage Limits	Supply Impedance Max	Peak Current at Nominal Volts
230	50	198 - 264	1.0 V/A	20 Amps
110	60	99 - 121	0.5 V/A	44 Amps
115	60	103 - 127	0.5 V/A	42 Amps
220	60	198 - 242	1.0. V/A	20 Amps

Notes

1 *Peak Current is for 22 secs max with stalled rotor.*
2 *Impedance affects compressor start-up capability.*

Basic Equipment

DESCRIPTION		PART NUMBER
Cryotome	220/240 V 50 Hz	0620M
	110/120 V 60 Hz	0620M/110
	220 V 60 Hz	0623M/220
Plastic Mat		0620-192
2 litre bottle		P13198

Accessories Pack supplied with Basic Equipment

DESCRIPTION	PACK OF:	PART NUMBER
Cryocassettes	5	0620-001
Shelf		0620-002
Debris Tray		0620-004
Flywheel Assembly		0620-118
Flywheel Bolt		0300-095
Flywheel Bolt Key		0300-124
Mains Lead	U.K	P13291
	EU	P13290
	U.S	P13292
Brush		P12940
Front Panel Keys	2	P13571
Operator Guide		77210164

Accessories Available on Separate Order

Solid Knife holder with Anti Roll Plate	0620-023
High Profile Disposable Knife holder with Anti Roll Plate	0620-021H
Low Profile Disposable Knife holder with Anti Roll Plate	0620-021L

Cryocassettes

Cryocassettes(25x25 mm)	5	0620-001
Biopsy Cryocassettes	5	0620-007
Heavy Duty Cryocassettes	5	0603
Specimen Tube	5	0605
Large Specimen Holder Tube (50mm)		0605-050
SimpleOrientating Head		0620-008
Fine Adjust Orientating Head		0620-006
Specimen Tube Adaptor		0620-820
Cryocassettes (28x40mm)	5	0620-026
(45mm dia)	5	0620-036
(35x35mm)	5	0620-039
(35mm dia)	5	0620-041
(Assorted)	4	77210080

Continued

Other Accessories

Complete Low Profile Disposable Blade Knife Holder	0620-021L
Complete High Profile Disposable Blade Knife Holder	0620-021H
Complete Knife Holder for Solid Knives	0620-023
Top Stage only of Low Profile Disposable Blade Holder	0620-022L
Top Stage only of High Profile Disposable Blade Holder	0620-022H
Top Stage only of Solid Knife Blade Holder	0620-024

Note

1 *See Catalogue for details of additional consumables and accessories.*

WARRANTY STATEMENT

9.1.1 Provided the terms of payment are duly complied with the Company undertakes to remedy any original defects arising from faulty materials or workmanship in any goods manufactured by the Company which under proper and normal conditions of use may develop within a period of twelve months from the date of delivery provided the same are returned to the Company as provided by this paragraph.

9.1.2 In the case of components which by their nature of application have an unpredictable life, this guarantee shall only be to the extent of the guarantee given by the manufacturers of these articles.

9.1.3 The Company will accept no liability where in the opinion of the Company the defect has been caused by damage due to the Buyer's failure to follow operating instructions, incorrect installation, wear and tear, or damage due to the use of spare parts other than those spare parts of the Company or which are recommended by the Company or where in the opinion of the Company the defect has been caused by alterations or repairs being undertaken by any person other than the Company.

9.1.4 Any damage claim must be in writing and give the serial number and description of goods, order number and date of delivery and will not apply where any names or serial numbers or other information which may be attached to or inscribed upon the goods have been removed, covered up or defaced in any way.

9.1.5 Any goods or parts thereof which may require repair or replacement shall be repaired or replaced (at the election of the Company) at the works of the Company only to which the Buyer shall deliver the same carriage paid at their risk and at the Buyer's expense. Any such goods or parts will be delivered by the Company to the Buyer free within the United Kingdom but if required to be delivered elsewhere the freight insurance and other charges from works to destination shall be borne by the Buyer. All faulty parts removed from the equipment will become the Company's property. Any other repairs or work by the Company will be carried out under the terms and conditions for specialist engineers currently in force.

9.1.6 If any goods or parts thereof are returned unnecessarily all costs involved, including a charge for inspection, handling and the return carriage must be paid by the sender. In no circumstances shall any of the goods be returned to the Company without its prior written consent.

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SUPPLY DETAIL

PRODUCT CODE .....
SERIAL NUMBER .....
FINAL TEST .....
DATE .....

INSTALLATION DETAIL

CUSTOMER .....
INSTALLER .....
DATE .....

Declaration of Conformity

Manufacturer's Name:	Life Sciences International (Europe) Limited,
Manufacturer's Address:	93 - 96 Chadwick Road, Astmoor, Runcorn,
	Cheshire WA7 1PR
	ENGLAND
Product Description:	Manually Operated Cryostat
Product Designation:	**Cryotome®**
Year of Marking (CE):	1996

This product conforms with the essential protection requirements of the EMC Directive, 89/336/EEC (*as amended by 92/31/EEC & 93/68/EEC*), and the Low Voltage Directive 73/23/EEC (*as amended by 93/68/EEC*).

This product complies with the following International Standards:

EMC:	EN55022 class A EN50082 - 1
Safety	IEC1010 - 1, 1990 +Amd.1,1992 + Amd.2,1995

Issued by: Mr R.Russell-Smith
Quality Assurance Manager
Life Sciences International (Europe) Limited

R. Russell-Smith

.....

(Signature)